Post-construction Monitoring Study for the Meadow Lake Wind Resource Area Benton and White Counties, Indiana

Year 2 Final Report

April 1 – May 15 and August 1 – October 15, 2022

Prepared for:

EDP Renewables

Attn: Erin O'Shea

1501 McKinney Street, Suite 1300
Houston, Texas 77010

Prepared by:

Meredith Rodriguez, Lucas Voorhees, Everett Abhainn and Ted Owen

Western EcoSystems Technology, Inc.
408 West Sixth Street
Bloomington, Indiana 47404

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WEST

EXECUTIVE SUMMARY

Meadow Lake Wind Farm I-VI, LLCs (collectively, Meadow Lake Wind Farm), are operating the Meadow Lake Wind Resource Area (MLWRA or Project). This report details the post-construction monitoring studies conducted in 2022, consistent with the Project's Habitat Conservation Plan (HCP) and Incidental Take Permit (ITP; ESPER0005174) for Indiana and northern long-eared bats (Covered Species). Turbines were operated to feather turbine blades under manufacturer's cut-in speed during spring and under increased cut-in speed during fall migration, per the Project's HCP.

Post-construction monitoring was completed in accordance with the study plan, which was approved by US Fish and Wildlife Service on March 9, 2022. The study plan was designed to achieve a 25% probability of detecting a single bat carcass (*g* of 0.25) for the 111 wind turbines at Meadow Lake Wind Farms V and VI (i.e., a study-wide *g*). The effort required to target a *g* of 0.25 at 111 turbines was spread between all of the phases and 414 turbines at the Project. The overall goal of this post-construction fatality monitoring study was to generate reliable fatality estimates for the Covered Species and to evaluate compliance with the incidental take authorization granted under the Project's ITP. More specifically, the objectives of this study were to estimate take for the Covered Species using the Evidence of Absence (EoA) framework as outlined in the HCP and to determine if adaptive management was necessary to maintain compliance with the Project's ITP.

Standardized carcass searches for bat carcasses were completed at three plot types: cleared plots, uncleared plots, and road and pads, and were conducted by two types of searchers: technician and dog-handler team (consisting of one dog trained to detect carcasses and one handler). The frequency of searches varied across seasons, with more searches occurring when take of Covered Species was considered more likely to occur. Searcher efficiency and carcass persistence trials were also conducted during each season to correct for detection and scavenger bias.

No Covered Species were found at the Project. Three hundred twenty-six bats were found during the study. The most commonly found bat species were eastern red bat (136 carcasses; 41.7%) and silver-haired bat (117 carcasses; 35.9%), followed by hoary bat (43 carcasses; 13.2%) and big brown bat (26 carcasses; 8.0%). One Seminole bat (0.3%) and two *Lasiurus* spp. were also recorded (0.6%). Species composition recorded at the Project was similar to previous studies at the Project and other wind facilities in the Midwest.

The *g* was 0.190 (95% confidence interval: 0.181–0.200). Based on the data collected to date, the EoA model estimated the mean annual fatality rates were 3.460 Indiana bats and 3.460 northern long-eared bats. The probability that the annual take rate exceeded the expected annual take rate was 0.282 for Indiana bat and 0.525 for northern long-eared bat. The cumulative take estimates through 2022 were three Indiana bat fatalities and three northern long-eared bat fatalities. The estimated levels of Indiana bat and northern long-eared bat take were below levels authorized within the ITP. No adaptive management actions are necessary at this time.

STUDY PARTICIPANTS

Meredith Rodriguez	Project Manager
Quintana Hayden	Senior Reviewer
Lucas Voorhees	Field Supervisor and Report Compiler
Anna Ciecka	Detection Dog Coordinator
Ted Owen	Evidence of Absence Analyst
Everett Abhainn	Statistician
Faith Kulzer	Lead Client Analyst
Meredith Hoggatt	Permitted Bat Biologist
Chazz Coleman	GIS Technician
Andrea Palochak	Technical Editor
Kendra Cummings	Field Technician
Alex Schwimmer	Field Technician
Sanketh Menon	Field Technician
Shauna Sampson	Dog Handler
Heather Nootbar	Dog Handler
Clover Rodriguez	Dog Handler

REPORT REFERENCE

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INTRODUCTION

Meadow Lake Wind Farm I-VI, LLCs (collectively, Meadow Lake Wind Farm), subsidiaries of EDP Renewables North America, LLC (EDPR), are operating the Meadow Lake Wind Resource Area (MLWRA or Project) in Benton and White counties, Indiana. EDPR obtained an Incidental Take Permit (ITP; ESPER0005174, dated March 31, 2021) for the federally listed endangered Indiana bat (*Myotis sodalis*) and the federally listed endangered northern long-eared bat[1] (*M. septentrionalis*; hereafter Covered Species) from the US Fish and Wildlife Service (USFWS). This report presents the results of the second year of compliance monitoring conducted under the ITP from April 1 – May 15 and August 1 – October 15, 2022. The objectives of this study were to estimate take of the Covered Species using the Evidence of Absence (EoA) framework as outlined in the Habitat Conservation Plan (HCP) and determine if adaptive management was necessary to maintain compliance with the Project's ITP.

STUDY AREA

The primary land cover type within 0.40 kilometer (km; 0.25 mile [mi]) of the turbines (i.e., within the Permit Area) is cultivated crops, which covers 96.9% of the Permit Area. The next most common land cover is developed areas (e.g., farmsteads) that collectively compose approximately 2.5% of the site. All other land cover types collectively make up less than 1% of the total land cover (Figure 1; National Land Cover Database 2019). The MLWRA is made up of six phases. Turbine capacities within the MLWRA range from 1.5 megawatts (MW) to 3.6 MW, with hub heights ranging from 79 to 105 meters (m; 259 to 344 feet [ft]), and rotor diameters ranging from 80 m to 136 m (262 to 446 ft; Table 1). All turbines are within the migratory range of the Covered Species, and EDPR adjusted turbine operations during the spring and fall migration periods to minimize impacts to the Covered Species (Table 2).

Table 1. Phases, turbines, and operational dates of the Meadow Lake Wind Resource Area, Benton and White counties, Indiana.

Phase	Turbine Type	Number of Turbines	Commercial Operational Date	Hub Height (m)	Blade Diameter (m)
I	Vestas V82 1.65 MW	121	2009	80	82
II	Acciona AW-82 1.5MW	66	2010	80	82
III	GE 1.5 SLE 1.5 MW	69	2010	80	80
IV	Suzlon S88 2.1 MW	47	2010	79	88
V	Vestas V110 2.0 MW	50	2017	95	110
VI	Vestas V110 2.0 MW	12	2019	95	110
	Vestas V136 3.6 MW	49	2019	105	136

m = meter; MW = megawatt.

1 The northern long-eared bat was listed as threatened when the ITP was received. Its status will change to endangered as of January 30, 2023.

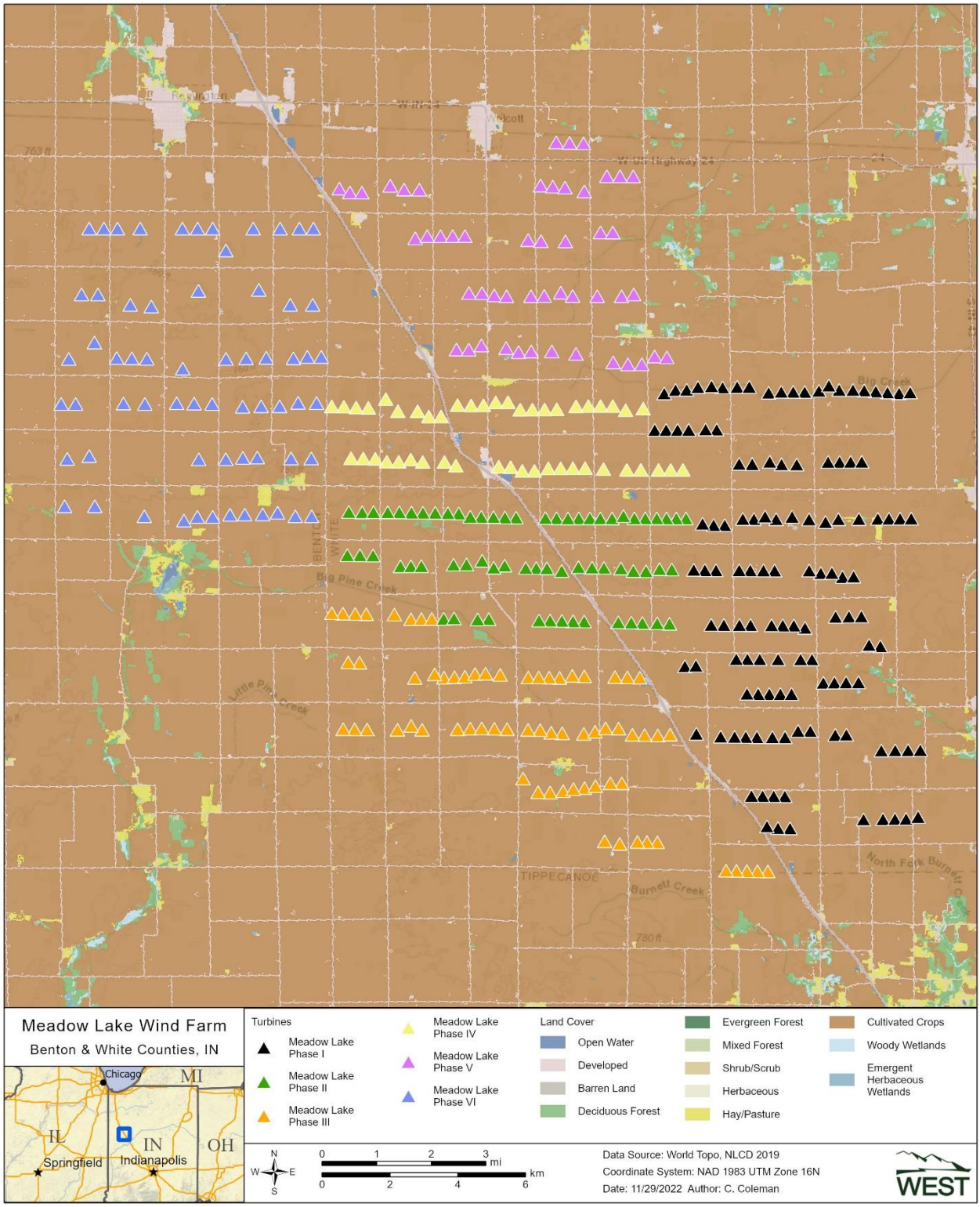

Figure 1. Turbine locations and surrounding land cover at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana.

Table 2. Seasonal turbine operations regime at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana.

Season	Turbines	Time of Day	Cut-In Speed	Feathering Below Cut-In[1]?	Temperature Threshold[2]
Spring (April 1 – May 15)	All	0.5 hour before sunset to 0.5 hour after sunrise	Manufacturer's Cut-in Speed[3]	Yes	10 °C
Summer (May 16 – July 31)	All	0.5 hour before sunset to 0.5 hour after sunrise	Manufacturer's Cut-in Speed[3]	Yes	10 °C
Fall (August 1 – October 15)	All	0.5 hour before sunset to 0.5 hour after sunrise	5.0 m/s	Yes	10 °C
Winter (October 16 – March 31)	All	Normal turbine operation			

[1] Feathering means that turbine blades will be pitched into the wind such that they spin at less than one rotation per minute.

[2] Turbines will be feathered below cut-in when temperatures are above the threshold (listed in degrees Celsius [°C]).

[3] The manufacturer's cut-in wind speed is 3.0 meters/second (m/s; 9.8 feet/second [ft/s]) to 4.0 m/s (13.1 ft/s) across the Project turbines.

METHODS

As specified in the HCP, Western EcoSystems Technology, Inc. (WEST), designed the monitoring effort to target a probability of detection, or *g*, of 0.25 for the 111 wind turbines at Meadow Lake Wind Farms V and VI (i.e., study-wide *g*). The effort required to target a *g* of 0.25 at 111 turbines was spread across all of the phases and 414 turbines at the Project. WEST used Project-specific data from previous post-construction monitoring studies at the Project to develop a study plan that targeted a *g* of 0.25 (Rodriguez et al. 2022) to meet the monitoring commitments in the HCP. WEST submitted a study plan to the USFWS on January 31, 2022, and received approval on March 9, 2022 (M. Reed, USFWS, pers. comm.).

Standardized Carcass Searches

Number of Turbines Sampled, Search Frequency, and Plot Size

Technicians and dog-handler teams conducted standardized carcass searches from April 1 – May 15 and August 1 – October 15, 2022. Search effort varied by season (Table 3, Figure 2), and was designed to maximize effort when the greatest number of Covered Species were expected to occur. Logistical constraints delayed mowing of cleared plots. Thus, for the purposes of analysis, the fall season was split into Fall 1 occurring prior to the completion of mowing (August 1 – August 15, 2022) and Fall 2 occurring after mowing (August 16 – October 15, 2022). Initial mowing started prior to August 1 and continued until August 15. Prior to mowing, cleared plots were searched as uncleared plots or road and pads to the extent possible.

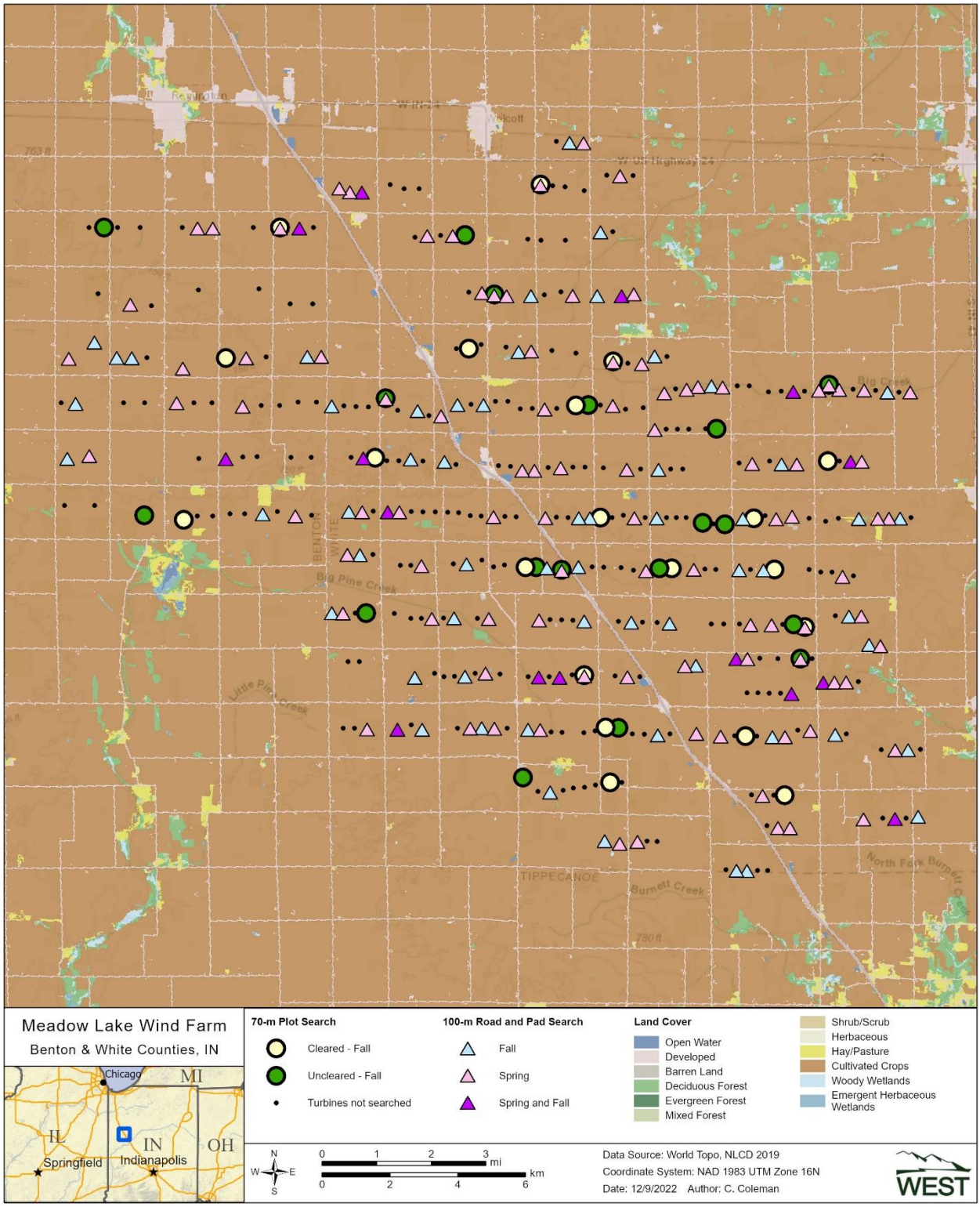

Figure 2. Turbines by plot type and surrounding land cover at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana.

Table 3. Search effort by season and plot type at Meadow Lake Wind Resource Area, Benton and White counties, Indiana.

Season	Plot Type	Search Interval	Number of Turbines	Search Team
Spring (April 1–May 15)	100-m road and pad	14 days	111	Technician
Fall (August 1–October 15)	100-m road and pad	7 days	73	Technician
	70-m cleared plot	7 days	20	Dog-handler
	70-m uncleared plot	7 days	18	Dog-handler

m = meter.

A technician searched the gravel road and pad areas (road and pad plots) under 111 turbines to a distance of 100 m (328 ft) from the turbine, every other week during the spring (Table 3). All searches occurred once per week during the fall (Table 3), A technician searched 73 turbines as road and pad plots to a distance of 100 m from the turbine (Figure 3). Dog-handler teams searched 20 turbines where crops were mowed within 70-m (290-ft) radius (70-m cleared plots; Figure 4) and 18 turbines as uncleared plots with a 70-m radius (70-m uncleared plots; Figure 5).

Uncleared plots were vegetated with soybeans (*Glycine max*) or alfalfa (*Medicago sativa*). A cross pattern, approximately 1.5 m (4.9 ft) wide, was mowed into the uncleared soybean plots to assist with plot access.

Figure 3. Representative photo of conditions of a 100-meter road and pad plot.

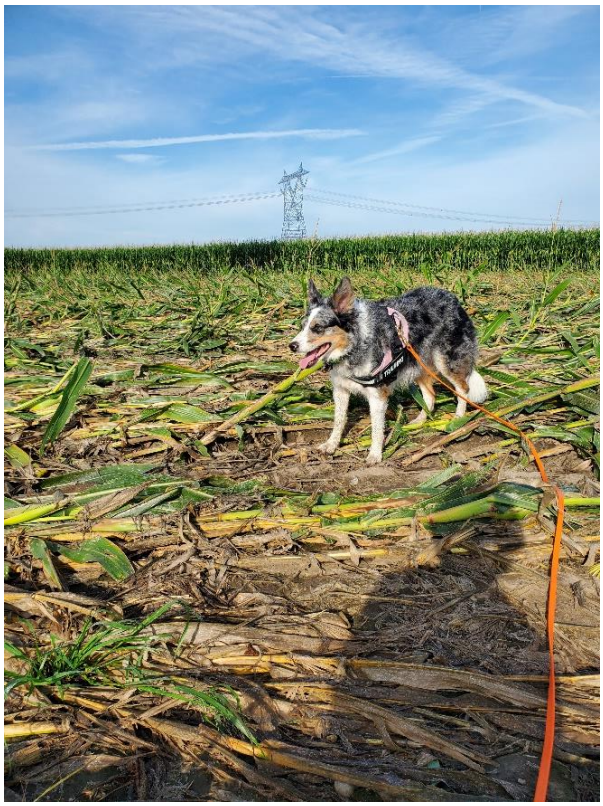

Figure 4. Representative photo of vegetation conditions in a 70-meter cleared plot.

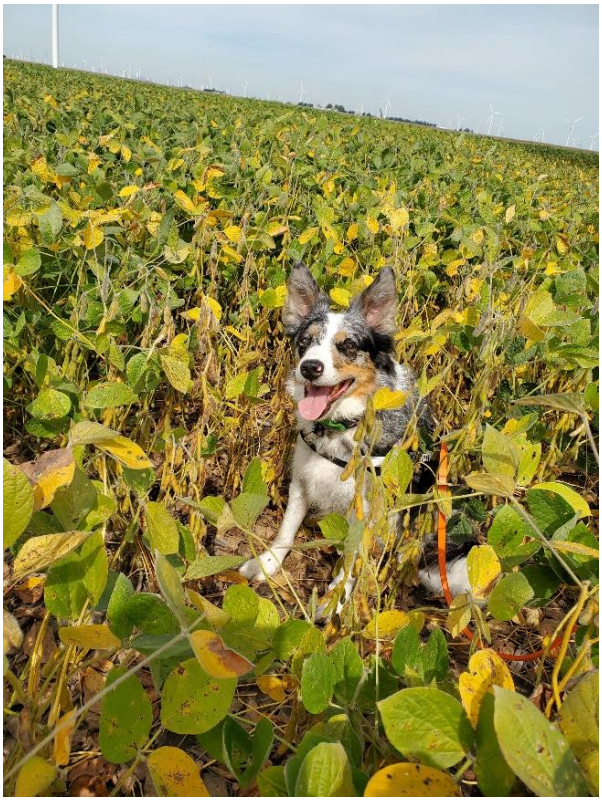

Figure 5. Representative photo of vegetation conditions in a 70-meter uncleared plot.

Search Methods

WEST used two types of search methods: a technician, or human-only visual search, and a dog-handler team, or olfactory search, where the team consisted of one technician/handler and one dog. All personnel were trained to follow the Project's study plan, including proper handling and reporting of carcasses. Carcass searches were conducted during the day, beginning as early as first light.

Road and Pad Searches — Technician Searches

Technicians walked transects spaced five m (16 ft) apart at a rate of approximately 45–60 m per minute (m/min; 148–197 ft/min) on all gravel road and pad areas within 100 m of the turbine. The technicians scanned the area for carcasses on both sides of the transects out to approximately 2.5 m (8.2 ft) to ensure full visual coverage of each search area. Technician searches were only conducted on road and pad plots.

Plot Searches — Dog-handler Team

Dog-handler teams searched 70-m cleared and 70-m uncleared plots for bat carcasses. Prior to each search, handlers determined the survey start points and the number of transects needed to cover the plot after taking into account wind speed and direction, as well as crop row direction and density (when applicable). Handlers oriented the detection dog to start searches

perpendicular to the wind to maximize scent detection. Both windspeed and crop density can affect dispersal of the target odor (i.e., bat carcasses) across the search area. To maximize detection rates during an olfactory search, transect width varied with vegetation density, ranging from five to 10 m (16 to 33 ft) apart in densely vegetated areas, to 10–15 m (33–49 ft) in shorter vegetation. Detection dogs were rewarded with either a food reward or a short play session when they correctly alerted to a bird or bat carcass.

Dog-handler Team Evaluation

Detection dogs were considered candidates for carcass searches if they met basic temperament, and obedience criteria, and demonstrated the trainability to detect bird and/or bat carcasses. Temperament characteristics sought after were high-energy and a high-food or toy drive. Prior to conducting searches at the Project, handlers trained their detection dogs on the scent of bat carcasses following methods derived from search and rescue programs and drug detection (Kay 2012, Helfers 2017). Dogs were initially trained with either cotton scent swabs that had been rubbed on bat carcasses, and progressing to dehydrated bat carcasses, or dehydrated bat carcasses, at increasing distances over a period of three to four weeks. Once the dog achieved a passing grade of 80% or higher in a scent recognition test, consisting of ten blind trial lineups using dehydrated bats, the dog and handler were evaluated in the field to measure their performance. The detection dog coordinator conducted a two day field evaluation of each dog-handler team; after teams achieved a searcher efficiency of 75% or greater for 15–30 dehydrated bats placed during blind evaluation trials, the teams were approved to conduct standardized carcass searches. Because the objective of the study focused on detecting bat carcasses, dogs were not explicitly trained on native bird carcasses; however, all detection dogs alerted on bird carcasses in the field, and handlers rewarded bird finds in the field to encourage future alerts to bird carcasses. Breeds used at the Project as detection dogs included a shepherd mix, a border collie/Australian shepherd mix, and a Dutch shepherd.

Data Collection

Technicians recorded the date, start and end times, technician name, turbine number, type of search, and if any carcasses were found for each scheduled search. When a carcass was found, technicians placed a flag near it and continued the search. After searching the entire plot, the technician returned to record information for each carcass on a data sheet, including the date and time, species, sex and age (when possible), technician name, turbine number, measured distance from turbine, azimuth from turbine, location of carcass using a geographic coordinate system (latitude and longitude), habitat surrounding carcass, carcass condition, and estimated time of death (e.g., less than one day, two days).

The condition of each carcass found was recorded using the following categories:

- Intact—a carcass that is complete, not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.

- Scavenged—an entire carcass that shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location (e.g., wings, skeletal remains, portion of a carcass, etc.), or a carcass that has been heavily infested by insects.
- Dismembered—a carcass found in multiple pieces distributed more than 1.0 m (3.3 ft) apart from one another due to scavenging or other reasons.
- Injured—a bat or bird found alive.

For bird carcasses, the following category was also used:

- Feather spot—Ten or more feathers (excluding down), or two or more primary feathers at one location indicating predation or scavenging of a bird carcass.

Technicians took digital photographs of each carcass, including any visible injuries, and surrounding habitat. No bird carcasses were collected, but a marker was placed next to each bird carcass to avoid duplicate counting. Bat carcasses were collected under the Project's ITP (ESPER0005174), WEST's Federal Native Endangered and Threatened Species Recovery Permit (TE234121-9), and WEST's State Special Purpose Salvage Permit (2229). Technicians placed each bat carcass in a re-sealable plastic bag labeled with a unique carcass identification number, turbine number, and date, for storage in a freezer on site. Leather gloves covered by nitrile or latex gloves were used to handle all bat carcasses to eliminate possible transmission of rabies or other zoonotic diseases. Live, injured bats were recorded and considered fatalities for analysis purposes when observed in search areas, and were handled in accordance with permit conditions (left in place).

Carcasses found in non-search areas (e.g., outside of a plot boundary) or outside of the scheduled study period were recorded as incidental discoveries and documented following the same protocol for those found during standard searches, but were not included in analysis.

Carcass Identification and Agency Notification

Identification of bird carcasses were verified by biologists with significant field experience in identification of birds and their feathers. The USFWS and the Indiana Department of Natural Resources (IDNR) would have been notified within 24 hours of positive identification any state- or federally listed species. A federally permitted bat biologist (ESPER0039249) verified the identifications of all bat carcasses in hand at the end of the surveys and delivered the carcasses to the USFWS Indiana Field Office on December 29, 2022.

Tissue samples collected from heavily scavenged or decomposed carcasses that could not be positively identified and had potential to be a Covered Species were submitted to a USFWS-approved laboratory, East Stroudsburg University Wildlife Genetics Institute, for identification.

Bat carcasses that were heavily scavenged but did not have potential to be a Covered Species (i.e., fur was present on the wing or forearms measured greater than 41mm) were identified to the closest genus or group possible and were not sent off for further identification.

Bias Trials

Searcher Efficiency Trials

The objective of the searcher efficiency trials was to estimate the probability that a carcass was found by searchers. Searcher efficiency trials were conducted in the same areas where carcass searches occurred. Technicians conducting carcass surveys did not know when searcher efficiency trials were being conducted or the location of the trial carcasses. Trial carcasses consisted of eastern red bats (*Lasiurus borealis*), big brown bats (*Eptesicus fuscus*), and silver-haired bats (*Lasionycteris noctivagans*) that had previously been found on site or provided by Indiana State University. One hundred eighteen carcasses were placed across all season and plot types to account for differences in search conditions by plot type and season.

Multiple trials were conducted in each season to measure potential changes in plot conditions on searcher efficiency over time. Each trial carcass was discreetly marked with a black zip-tie and/or a piece of electrical tape around the upper forelimb for identification as a study carcass after it was found. Carcasses were dropped from waist height or higher and allowed to land in a random posture. The trial administrator walked in a meandering path and dropped trial carcasses for detection dogs the day prior to the next search to allow time for the scent to pool and disperse prior to scheduled searches, and to eliminate a direct scent trail. For technician search trials, the trial administrator placed carcasses prior to the technician searching the plot, either the night before or the morning of searches depending on work schedules.

Searchers had one chance to locate trial carcasses during the first search after carcass placement. The number and location of trial carcasses found during the search were recorded, and the number of trial carcasses available for detection was determined immediately after each trial by the person responsible for distributing the carcasses. Following searches, any carcasses that were not detected were checked to confirm availability. Twelve trial carcasses were left in place and used for carcass persistence trials.

Carcass Persistence Trials

The objective of carcass persistence trials was to estimate the average probability a carcass would persist, or be available for detection, in the field, given the search interval. Carcasses could be removed by scavenging or rendered undetectable by typical farming activities. A minimum of 15 trial carcasses were placed in each season and plot type to incorporate the effects of varying weather and scavenger densities on carcass persistence. No more than two trial carcasses were placed on a plot to avoid potential over-seeding and attracting scavengers.

Technicians monitored the trial carcasses over a 30-day period according to the following schedule, as closely as possible. Carcasses were checked daily for the first four days, then on day 7, 10, 14, 20, and 30. Trial carcasses were monitored until they were completely removed or

the trial period ended. Dog-handler teams were used on the 70-m cleared and uncleared plots to determine when carcasses were removed, while technicians determined the status of carcasses placed on 100-m road and pads.

Search Area Mapping

Technicians recorded the boundaries of 100-m road and pads and 70-m cleared plots using an Eos sub-meter Global Positioning System unit. Unsearchable areas within plot boundaries were also mapped. The plot boundaries were used to verify if carcasses were found inside the search areas and to inform the distribution of carcasses around turbines to estimate the number of carcasses that fell inside or outside of search areas. A 72-m (236-ft) radius projection was applied to 70-m uncleared plots. The additional 2.0 m (6.6 ft) were added to the radius to account for the width of the turbine tower.

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, technicians were responsible for inspecting data forms for completeness, accuracy, and legibility. Potentially erroneous data were identified using a series of database queries. Irregular codes or data suspected as questionable were discussed with the technician and/or Project Manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes and measures were implemented. A Microsoft® SQL database was developed to store, organize, and retrieve survey data. All data forms and electronic data files were retained for reference.

Statistical Analysis

The EoA (Dalthorp et al. 2017) modeling framework was used to estimate take of the Covered Species. EoA was used with data collected in the field to estimate the overall probability of detecting a bat fatality, the take rate of Covered Species, and the number of Covered Species carcasses that occurred. Data used in the EoA model included number of Covered Species fatalities, fatality spatial data from all bats found during surveys, the results of searcher efficiency and carcass persistence trials, the seasonal arrival distribution of bats (described below), and the detection reduction factor (*k*; described below).

Searcher Efficiency Estimation

Searcher efficiency was estimated separately for technicians and dog-handler teams to account for different modes of detection (i.e., technicians use sight, whereas dogs use scent). EoA uses raw searcher efficiency data (e.g., number of found and available trial carcasses) to inform overall probability of detection. However, to determine if searcher efficiency data should be pooled, or separated by strata such as season and/or plot type, we modeled searcher efficiency using logistic regression. For both technicians and dog-handler team models, model selection was completed using an information theoretic approach known as AICc, or corrected Akaike Information Criterion (Burnham and Anderson 2002). The best model was selected as the most

parsimonious model within two AICc units of the model with the lowest AICc value. Searcher efficiency data were input into the EoA software according to the model selection results.
The change in searcher efficiency between successive searches was defined by a parameter called the detection reduction factor (*k*) that can range from zero to one. When *k* is zero, it implies a carcass that was missed on the first search would never be found on subsequent searches. A *k* of one implies searcher efficiency remained constant no matter how many times a carcass was missed. Huso et al. (2017) estimated a value of $k = 0.67$ for bats, and this value was used to calculate bat fatality estimates using EoA per the HCP.

Carcass Persistence Rate Estimation

Data collected during carcass persistence trials were used to estimate the probability carcasses remained available to be located by the searcher, given the search interval (i.e., the time between scheduled searches). The average probability a carcass persisted was estimated using an interval-censored survival regression with four potential distributions: exponential, log-logistic, lognormal, and Weibull distributions (Kalbfleisch and Prentice 2002, Dalthorp et al. 2018). As with searcher efficiency, carcass persistence models were estimated separately by search team (i.e., plots searched by technicians versus plots searched by dog-handler teams) to account for different modes of detection. Season was included as a potential covariate for the technician model, and plot type was included as a potential covariate for the dog-handler model. The best model was selected as the most parsimonious model within two AICc units of the model with the lowest AICc value. The parameter estimates of the selected model (α [shape] and β [scale], including the 95% Confidence Interval [CI] of β) were used as inputs in the EoA Single Class module.

Area Adjustment

The search area adjustment accounted for unsearched areas beneath turbines, and was calculated as a probability that ranged from zero to one. The area adjustment was estimated as the product of the proportion of searched area around each turbine and a carcass-density distribution. A truncated weighted maximum likelihood (TWL) modeling approach (Khokan et al. 2013) was used to estimate the carcass-density distribution using site-specific fatality locations. The TWL approach uses weights based on probability of detection and the proportion of area searched in each 1.0-m annulus around the turbine. Due to the variation in turbine sizes (hub heights range from 79–105 m and blade lengths range from 80–136 m in diameter), separate area adjustments were fit a priori for each turbine size. Distributions considered were normal, gamma, Gompertz, and Weibull (parameterized according to R Development Core Team [2016] and Yee [2010]). The best model was selected using AICc. The proportion of area searched was calculated in a geographic information system as the amount of area searched divided by the total area searched at each 1.0-m annulus around the turbine.

Carcasses Excluded from Analysis

Fatalities were excluded from the analysis when the carcass was discovered outside of the spatial and temporal scope of the survey design. For example, carcasses found outside a designated plot were not included in the analysis because the TWL fitting procedure accounts for unsearched

areas. Carcasses found prior to the start of surveys (e.g., a carcass found on a plot in the spring that was estimated to have died prior to April 1) were also excluded because the carcass occurred outside of the study period. Note that carcasses found on a plot incidentally (e.g., found by maintenance personnel) were included in the analysis if that plot had a scheduled search in the future, but within the same season. If a fatality of a Covered Species had been found outside of the spatial or temporal scope of the survey design it would still be excluded from the area correction estimate, but would be included in the EoA fatality estimate following Dalthorp et al. 2020.

Covered Species Take and Detection Probability Estimates

EoA was used to estimate the median cumulative take to-date (*M**), mean annual take rate (λ), and evaluate the probability that the estimated take rate (λ) exceeded the expected take rate (τ) for Indiana bat and northern long-eared bat (i.e., Covered Species). Estimates were calculated using the EoA method (Dalthorp et al. 2017), using the Single Class, Multiple Class, and Multiple Years modules of EoA.

The *g* was estimated using the bias corrections for searcher efficiency, carcass persistence, and area searched, as well as the assumed seasonality of risk the Covered Species, which per the HCP, was 11% in the spring and 89% in the fall. The seasonal risk is used to weight the contributions of detection probability from different seasons in the overall g estimate.

The EoA Single Class module was used to estimate the detection probability in each search stratum. This resulted in alpha (α) and beta (β) parameters that defined the beta distribution of detection probability in each stratum. The EoA Multiple Class module was then used to combine detection probability distributions across strata (i.e., 70-m cleared plots, 70-m uncleared plots, and road and pads), with weights for each class ("DWP" in the software) defined by the within-season sampling fraction. The beta distribution parameters were set to Ba = 0.01 and Bb = 1,000 (a detection probability of 10^{-5}) for unsearched areas within each stratum. The results from the Multiple Years module (Ba and Bb parameters for the detection probability for the permit term to date) were used to estimate *M** (the median cumulative take over the life of the permit), λ (the underlying annual take rate over the past two monitoring periods) and its 95% CI, and the probability that $\lambda > \tau$, where τ is the authorized take number divided by the number of years in the permit. Appendix D shows how the compliance metrics were calculated using the EoA Graphical User Interface[2]. For this study, the mowing delays (and, thus, unplanned changes in searchable area) at the Project were accounted for by splitting the fall monitoring season into two fall seasons, with Fall 1 occurring prior to mowing (August 1 – August 15), and Fall 2 occurring after mowing (August 16 – October 15). The fall arrival proportion of 0.89 was rescaled according to the proportion of the total number of days in the fall monitoring period that fell within each fall sub-season, assuming uniform carcass arrival within the fall season (Table 4). Cross-season relative turbine operations and the arrival proportions were multiplied and then re-scaled to sum to one across seasons. These values defined the weights for combing the Beta distribution

[1] There may be very minor differences between screen shots and the results in the main text because EoA is a stochastic estimator, leading to slightly different estimates each time the modules are run.

parameters across seasons. This procedure produced an overall, site-wide estimate of detection probability for the Project in 2022.

Table 4. Subseason weights for the fall season at Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Season	Subseason Weight
Fall 1 (August 1 – August 15)	0.197
Fall 2 (August 16 – October 15)	0.803

Furthermore, the Multiple Years Module was used to estimate the site-wide, cumulative detection probability from 2021–2022. The EoA Multiple Years Module requires the input ρ, which weights the years appropriately for combining beta distribution parameters. In 2021 and 2022, the Project was fully operational for all seasons, so ρ was set to 1. A study-wide *g* (the overall probability of detection limited to the turbines sampled during monitoring) and site-wide *g* (the overall probability of detection for all turbines) were calculated based on the 111 turbines studied and 414 total turbines, respectively. The site-wide *g* was used to estimate take rates of the Covered Species.

Adaptive Management Triggers

The estimates from the EoA analysis were used to test two adaptive management triggers: a short-term test of whether the estimated take rate exceeded the expected take rate and a long-term test of whether permitted take had been met (Dalthorp and Huso 2015). Both the short- and long-term triggers were tested individually for each of the Covered Species.

Evidence of Absence Short-term Trigger

The EoA short-term trigger is designed as an early warning signal that the Project may be on the path to exceeding permitted take (T) by the end of the permit term. The short-term trigger is designed to determine if an adaptive management response is needed to prevent the cumulative take estimate from actuating a response to the long-term trigger test. The short-term trigger tests if the estimated annual take rate (λ) exceeded the expected take rate (τ = T ÷ years in permit) at a confidence level of α = 0.05, per the HCP. The Project's short-term trigger is designed to evaluate a rolling window of six years of post-construction monitoring data. If, within any six-year rolling window, the estimated take rate exceeds the expected take rate with 95% confidence, the short-term trigger would be met, indicating that the minimization plan in the HCP may need to be adjusted to ensure that the median cumulative take estimate (*M**) remains within the permitted limit over the ITP term. Two years of data were used in this analysis, 2021 and 2022.

Evidence of Absence Long-term Trigger

The EoA long-term trigger is designed to test if the cumulative take to date is equal to or greater than the permitted take (T). Per the HCP, cumulative take to date (*M**) was estimated at a confidence level of α = 0.5 (using the median, or 50th credible bound, of the posterior distribution of estimated mortality). If the cumulative take to date at α = 0.5 is less than the total permitted take (*M** < T), then no changes are necessary. If the cumulative take to date at α = 0.5 is greater than or equal to the total permitted take (*M** ≥ T), then the take limit has been met and the Project must enact avoidance measures.

RESULTS

Standardized Carcass Searches

A total of 1,529 searches were conducted during the spring and fall monitoring seasons; 12 searches (less than 0.8%) were missed due to turbine maintenance, delayed mowing, weather constraints, and/or safety hazards.

No federally or state-listed bat species were found. One loggerhead shrike (*Lanius ludovicianus*), a state-listed bird species, was recorded at Turbine 627 on August 3, 2022 (Appendix A), and the IDNR was notified within 24 hours of positive identification (on August 11, 2022). Three hundred twenty -six bat carcasses and 71 bird carcasses were found during surveys and incidentally (Appendix A). The most commonly found bat species were eastern red bat (136 carcasses; 41.7%) and silver-haired bat (117 carcasses; 35.9%), followed by hoary bat (*Lasiurus cinereus*: 43 carcasses; 13.2%) and big brown bat (26 carcasses; 8.0%). One Seminole bat (*L. seminolus*; 0.3%) and two *Lasiurus* spp. bats were also found (0.6%; Appendices A and B). Seven heavily scavenged bats (e.g., wing membrane only, bones, or partial carcasses) were sent off for identification via deoxyribonucleic acid (DNA) analysis; six were identified as silver-haired bats. DNA testing for one of the heavily scavenged bats failed to isolate DNA due to the decomposition of the sample. A second tissue sample was sent for a second attempt at DNA identification, but the results have not yet been received. For the purposes of the analysis, and per the HCP, this bat was labeled as unknown and was not presumed to be a Covered Species.

Statistical Analysis

Bias Trials

Searcher Efficiency Trials

One hundred eighteen bats were placed for searcher efficiency trials on 13 separate dates, and 104 were available for search teams to find across all plot types. The best-fit model for searcher efficiency on 70-m plots did not support the inclusion of plot type as a covariate, meaning there was not a statistically meaningful difference between searcher efficiency rates on uncleared and cleared plots (Appendix C). The best-fit model for searcher efficiency on road and pads did not support the inclusion of season as a covariate, meaning there was not a statistically meaningful difference between searcher efficiency rates across seasons (Appendix C). Searcher efficiency rates ranged from 66.0% on cleared and uncleared plots to 96.1% on road and pads (Table 5).

Table 5. Searcher efficiency results by plot type at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Plot Type	Number Placed	Number Available	Number Found	Percent Found
70-meter Plots (Cleared and Uncleared)	63	53	35	66.0
Road and Pads	55	51	49	96.1

Carcass Persistence Trials

Fifty-seven carcasses were placed to estimate carcass persistence.[3] The best-fit model for carcass persistence rates on 70-m cleared and uncleared plots searched by dog-handler teams had a Weibull distribution and did not includeany covariates, which suggests carcass persistence did not vary by plot type (Appendix C). The best-fit model for carcass persistence rates on 100-m road and pads had an exponential distribution and did not include any covariates, which suggests carcass persistence did not vary by season (Appendix C). The average probability that a carcass persisted through a 13.8-day search interval was 0.67 (90% CI: 0.58–0.74) on 100-m road and pads. The average probability that a carcass persisted through a 7.1-day search interval was 0.63 (90% CI: 0.51–0.75) on 70-m cleared and uncleared plots and 0.81 (90% CI: 0.74–0.86) on 100-m road and pads (Figure 6).

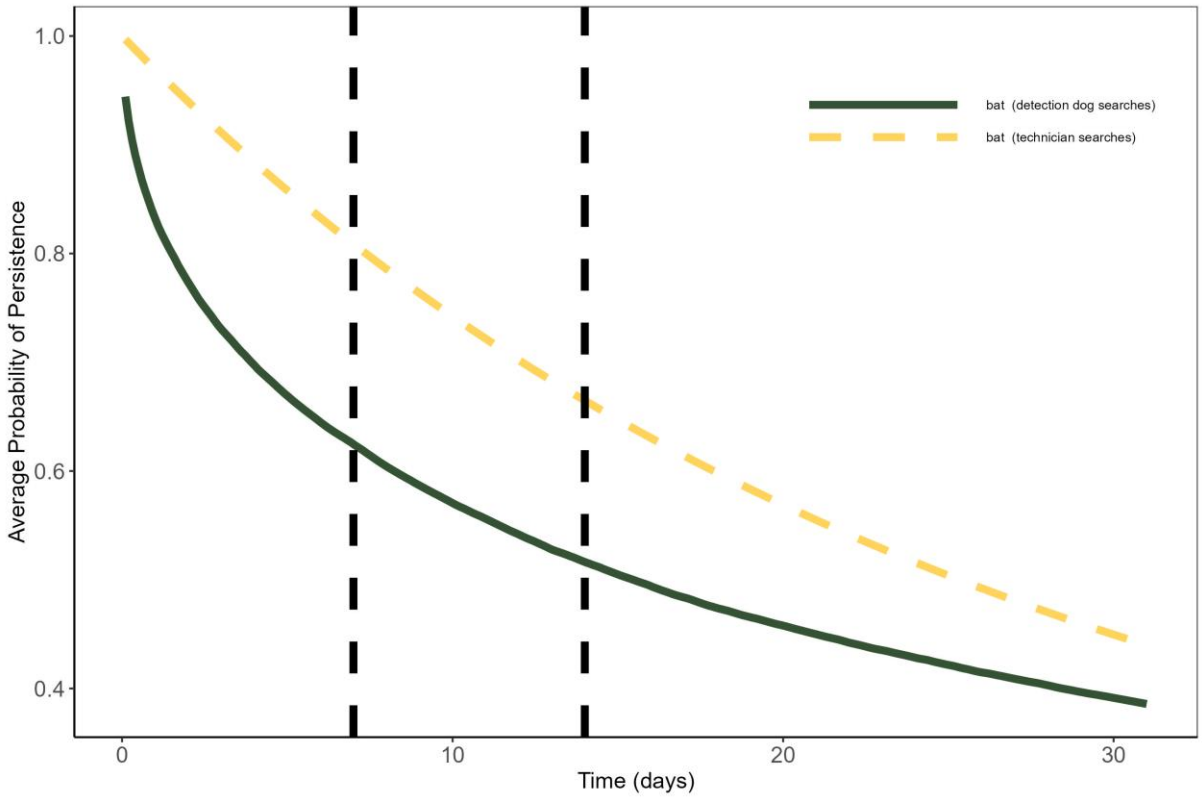

Figure 6. The average probability of persistence, in days, at different search intervals and for different searcher types at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Note: The vertical dashed lines indicate the 7 and 14 day search intervals used in this study.

Area Adjustment

Thirty of the 326 bats found during the monitoring season were excluded from modeling the area adjustment for EoA. Seven bat carcasses were excluded from analysis because they were found

[3] Sixty carcasses were placed for carcass persistence trials; however, three were later excluded from analysis due to mowing issues and missed searches.

off plot. Another 23 bats were excluded because their estimated time of death was prior to the start of surveys (Appendix B). The TWL area adjustment for bats at 100-m road and pads was estimated to range between 0.08–0.17. The TWL area adjustment for bats at 70-m plots was estimated to range between 0.85–0.99 (Table 6; Appendix C).

Table 6. Truncated weighted maximum likelihood search area adjustment estimates for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Blade Length*	Search Area Type	Distribution	Parameter 1	Parameter 2	Area Adjustment
38.5 m	70-m cleared and uncleared	Weibull	2.5297	47.4170	0.91
	100-m road and pad	Weibull	2.5297	47.4170	0.08
41 m(1.5 MW)	70-m cleared and uncleared	Weibull	2.5297	47.4170	0.85
	100-m road and pad	Weibull	2.5297	47.4170	0.08
41 m(1.65 MW)	70-m cleared and uncleared	Weibull	2.5297	47.4170	0.98
	100-m road and pad	Weibull	2.5297	47.4170	0.11
44 m	70-m cleared and uncleared	Weibull	2.5297	47.4170	0.99
	100-m road and pad	Weibull	2.5297	47.4170	0.09
55 m	70-m cleared and uncleared	Weibull	2.5297	47.4170	0.97
	100-m road and pad	Weibull	2.5297	47.4170	0.17
68 m	70-m cleared and uncleared	Weibull	2.5297	47.4170	0.89
	100-m road and pad	Weibull	2.5297	47.4170	0.16

* 38.5-meter (m) blades (1.5 megawatts [MW]), n = 30; 41-m blades (1.5 MW), n = 29; 41-m blades (1.65 MW), n = 69; 44-m blades (2.1 MW), n = 19; 55-m blades (2.0 MW), n = 26; 68-m blades (3.6 MW), n = 25.

Portions of two 70-m plots were regularly unable to be searched because the boundaries crossed into parcels of non-participating landowners. One plot was searched as partial plot along an agricultural swale prior to being mowed. In all cases, the unsearchable areas were delineated and accounted for with the TWL area adjustment.

Covered Species Take Estimates

No Covered Species carcasses were found during the study. No Indiana bats and no northern long-eared bats have been found to date under the ITP. The study-wide *g* distribution achieved for the 2022 monitoring period was 0.190 (95% CI: 0.181–0.200). The site-wide *g* was 0.051 (95% CI: 0.049–0.054; Table 7). Inputs required to run the EoA Single Class module and stratum-specific *g* distribution values and inputs required for the Multiple Class module are described in Appendix D.

Table 7. Probability of detection (*g*), Ba, and Bb, for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from 2021–2022.

Year	Ba*	Bb*	*g*	95% CI
2021	1,605.22	15,648.77	0.093	0.089–0.097
2022	1,425.28	26,486.5	0.051	0.049–0.054
λ and Short-term Trigger (Last 2 Years)	2,907.86	37,451.47	0.072	0.070–0.075
*M** and Long-term Trigger (Cumulative)	2,907.86	37,451.47	0.072	0.070–0.075

* Ba and Bb are the parameters for the beta distribution used to characterize the probability of detection. The *g* value is the mean of that distribution.

CI = confidence interval

Mean annual take rates based on 2021–2022 were estimated to be 3.460 (95% CI: 0.003–17.391) Indiana bats per year and 3.460 (95% CI: 0.003–17.391) northern long-eared bats per year (Table 8). The expected average annual take rates reported in the HCP were 4.0 Indiana bats per year and 1.4 northern long-eared bats per year.

Table 8. Probability the estimated take rates exceeded the expected take rates for studies conducted within the rolling average interval at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, Incidental Take Permit Years 1–2 (2021–2022).

Species	Mean λ (95% CI)	Expected Take Rate (τ)	Pr(λ > τ) *	Short-Term Trigger Fires at α = 0.05?
Indiana bat	3.460 (0.003-17.391)	4.0	0.282	No
Northern long-eared bat	3.460 (0.003-17.391)	1.4	0.525	No

* Pr(λ > τ) reads, "the probability that λ (the annual take rate) is greater than τ (the expected annual take rate based on the total permitted take, used as a threshold for adaptive management)." If this probability is less than 0.95 (e.g., α = 0.05 for a 1-sided test), then no adaptive management is triggered because there is not sufficient evidence that the estimated annual take rate is greater than the expected annual take rate.

Cumulative take under the ITP to-date (2021–2022), *M*,* at α = 0.5 (50th credible bound), is estimated to be three Indiana bats and three northern long-eared bats (Table 9). The total take permitted by the ITP is 727 Indiana bats and 167 northern long-eared bats over the 29-year permit term.

Adaptive Management Triggers

Evidence of Absence Short-term Trigger

The short-term trigger assesses the probability that the estimated take rate exceeded the expected take rate, Pr(λ > τ). At a 95% confidence level (α = 0.05), Pr(λ > τ) must be greater than or equal to 0.95 for the short-term trigger to fire. For Indiana bat, Pr(λ > τ) = 0.282 and for northern long-eared bat, Pr(λ > τ) = 0.525 (Table 8). Neither probability meets or exceeds 0.95, indicating the short-term trigger was not met and no adaptive management actions are necessary (Table 8, Figure 7).

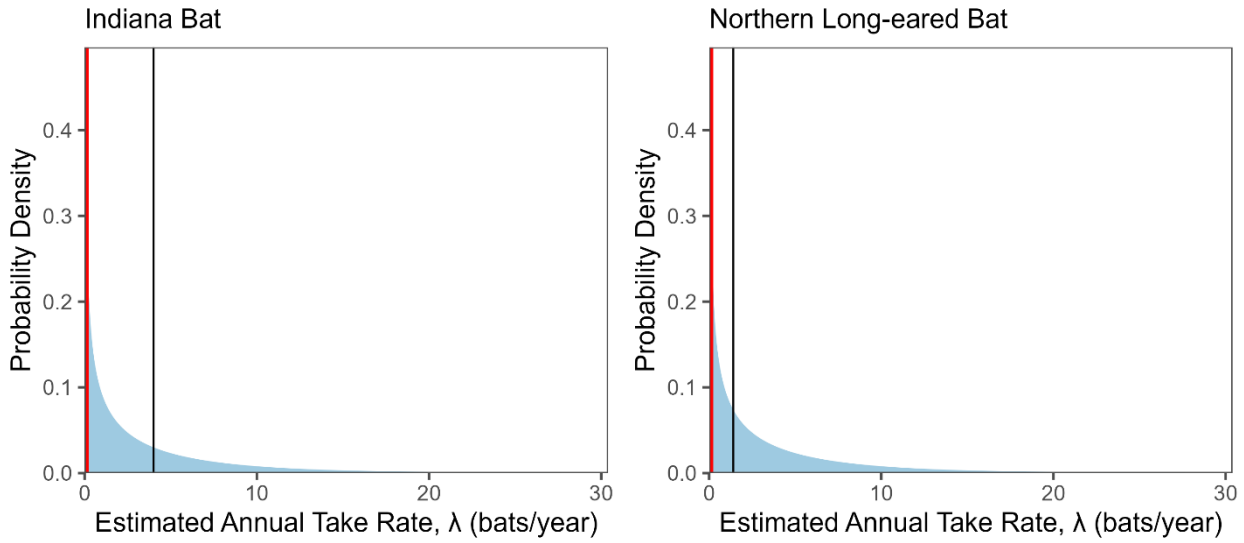

Figure 7. Estimated annual take rates (λ), in bats per year, at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, Incidental Take Permit Years 1–2 (2021–2022).

Note: The red region of the posterior distributions shows the region of the lower 5% quantile of the distributions (red region may not be visible when the posterior distribution is skewed heavily toward zero). The vertical line marks the expected take rate. The short-term trigger evaluates whether the vertical line falls within or to the left of the red region of the posterior distributions. For both species, the short-term trigger is not met because the vertical line (expected take rate) is not within or to the left of the red regions. In other words, the probability that estimated take rate is greater than the expected take rate does not exceed 95%.

Evidence of Absence Long-term Trigger

The estimated cumulative take to date, *M** at α = 0.5 (50th credible bound), is below the total permitted take for both Covered Species (Table 9). The long-term trigger was not met and Meadow Lake Wind Farm is in compliance for both species because *M** < T for both species. Therefore, an avoidance response is not necessary.

Table 9. Cumulative take estimates to date using Evidence of Absence for studies conducted within the Incidental Take Permit (ITP) term to date at Meadow Lake Wind Resource Area, Benton and White counties, Indiana, ITP Years 1–2 (2021–2022).

Species	Cumulative take (M*)	Permitted take (T)	Long-term trigger fires at α = 0.5?
Indiana bat (50th credible bound)	3	727	No
northern long-eared bat (50th credible bound)	3	167	No

CONCLUSIONS

The post-construction monitoring effort completed in 2022 was consistent with the HCP's monitoring requirements and the Project's 2022 study plan. No Covered Species carcasses were found. Estimates of potential take for the Covered Species were below the levels authorized by the ITP and no adaptive management was necessary.

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Appendix A. Carcasses Found during the 2022 Post-construction Monitoring Surveys

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
Bat Carcasses						
05-Apr-22	hoary bat	1	116	carcass search	100-m road and pad	scavenged
11-Apr-22	silver-haired bat	57	4	carcass search*	100-m road and pad	intact
19-Apr-22	eastern red bat	35	120	carcass search	100-m road and pad	intact
21-Apr-22	hoary bat	9	624	carcass search	100-m road and pad	intact
02-May-22	silver-haired bat	35	1	carcass search	100-m road and pad	scavenged
29-Jul-22	eastern red bat	36	603	carcass search*	100-m road and pad	scavenged
01-Aug-22	big brown bat	9	17	carcass search	100-m road and pad	scavenged
01-Aug-22	eastern red bat	43	33	carcass search	100-m road and pad	scavenged
01-Aug-22	eastern red bat	32	50	carcass search	70-m uncleared plot	scavenged
01-Aug-22	hoary bat	14	96	carcass search	100-m road and pad	scavenged
01-Aug-22	hoary bat	12	549	carcass search	70-m cleared plot	scavenged
02-Aug-22	big brown bat	18	210	carcass search	100-m road and pad	scavenged
02-Aug-22	hoary bat	1	210	carcass search	100-m road and pad	scavenged
02-Aug-22	hoary bat	16	230	carcass search	70-m cleared plot	scavenged
02-Aug-22	eastern red bat	22	514	carcass search	100-m road and pad	scavenged
02-Aug-22	big brown bat	9	533	carcass search	100-m road and pad	scavenged
02-Aug-22	eastern red bat	6	535	carcass search*	70-m uncleared plot	intact
02-Aug-22	big brown bat	25	539	carcass search	100-m road and pad	scavenged
03-Aug-22	hoary bat	27	332	carcass search	70-m uncleared plot	scavenged
03-Aug-22	eastern red bat	25	359	carcass search	70-m uncleared plot	scavenged
03-Aug-22	hoary bat	25	359	carcass search	70-m uncleared plot	scavenged
03-Aug-22	hoary bat	16	406	carcass search	70-m cleared plot	intact
03-Aug-22	big brown bat	25	620	carcass search	100-m road and pad	scavenged
04-Aug-22	eastern red bat	34	640	carcass search	100-m road and pad	scavenged
04-Aug-22	big brown bat	16	653	carcass search	100-m road and pad	scavenged
05-Aug-22	big brown bat	63	658	carcass search	70-m cleared plot	scavenged
08-Aug-22	big brown bat	3	41	carcass search	100-m road and pad	scavenged
08-Aug-22	hoary bat	24	50	carcass search	70-m uncleared plot	scavenged
08-Aug-22	big brown bat	33	90	carcass search	100-m road and pad	scavenged
08-Aug-22	eastern red bat	5	104	carcass search	100-m road and pad	scavenged
08-Aug-22	hoary bat	29	510	carcass search	70-m cleared plot	scavenged
08-Aug-22	hoary bat	53	549	carcass search	70-m cleared plot	scavenged
09-Aug-22	hoary bat	1	68	carcass search	70-m cleared plot	scavenged
09-Aug-22	hoary bat	21	68	carcass search	70-m cleared plot	scavenged
09-Aug-22	hoary bat	8	69	carcass search	70-m uncleared plot	scavenged

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
09-Aug-22	big brown bat	12	106	carcass search	70-m cleared plot	scavenged
09-Aug-22	eastern red bat	38	106	carcass search	70-m cleared plot	scavenged
09-Aug-22	unidentified Lasiurus bat	15	106	carcass search	70-m cleared plot	scavenged
09-Aug-22	eastern red bat	19	314	carcass search	100-m road and pad	scavenged
09-Aug-22	eastern red bat	46	316	carcass search	100-m road and pad	scavenged
09-Aug-22	eastern red bat	32	332	carcass search	70-m uncleared plot	scavenged
09-Aug-22	eastern red bat	22	332	carcass search	70-m uncleared plot	scavenged
09-Aug-22	eastern red bat	1	518	carcass search	100-m road and pad	scavenged
09-Aug-22	eastern red bat	19	542	carcass search	70-m cleared plot	scavenged
09-Aug-22	eastern red bat	22	542	carcass search	70-m cleared plot	scavenged
09-Aug-22	hoary bat	28	542	carcass search	70-m cleared plot	scavenged
10-Aug-22	eastern red bat	39	446	carcass search	100-m road and pad	intact
10-Aug-22	eastern red bat	23	603	carcass search*	100-m road and pad	scavenged
10-Aug-22	eastern red bat	36	646	carcass search	100-m road and pad	scavenged
11-Aug-22	eastern red bat	12	359	carcass search	70-m uncleared plot	scavenged
11-Aug-22	eastern red bat	10	405	carcass search	70-m uncleared plot	scavenged
11-Aug-22	eastern red bat	40	406	carcass search	70-m cleared plot	scavenged
12-Aug-22	eastern red bat	40	241	carcass search*	70-m cleared plot	scavenged
12-Aug-22	big brown bat	49	445	carcass search	70-m cleared plot	scavenged
12-Aug-22	eastern red bat	32	445	carcass search	70-m cleared plot	scavenged
12-Aug-22	big brown bat	31	610	carcass search	70-m uncleared plot	intact
12-Aug-22	eastern red bat	32	623	carcass search	70-m cleared plot	scavenged
12-Aug-22	eastern red bat	41	623	carcass search	70-m cleared plot	scavenged
12-Aug-22	eastern red bat	27	659	carcass search	70-m uncleared plot	intact
15-Aug-22	eastern red bat	3	11	carcass search	100-m road and pad	intact
15-Aug-22	eastern red bat	24	58	carcass search	70-m cleared plot	scavenged
15-Aug-22	hoary bat	3	110	carcass search*	70-m cleared plot	scavenged
16-Aug-22	big brown bat	66	79	carcass search	70-m uncleared plot	scavenged
16-Aug-22	eastern red bat	31	106	carcass search	70-m cleared plot	scavenged
16-Aug-22	eastern red bat	27	106	carcass search	70-m cleared plot	scavenged
16-Aug-22	hoary bat	32	106	carcass search	70-m cleared plot	scavenged
16-Aug-22	eastern red bat	36	211	carcass search	100-m road and pad	scavenged
16-Aug-22	eastern red bat	5	529	carcass search	100-m road and pad	intact
16-Aug-22	eastern red bat	23	529	carcass search	100-m road and pad	scavenged
16-Aug-22	eastern red bat	37	529	carcass search	100-m road and pad	intact
16-Aug-22	big brown bat	20	539	carcass search	100-m road and pad	scavenged

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
17-Aug-22	eastern red bat	14	347	carcass search	100-m road and pad	scavenged
17-Aug-22	eastern red bat	18	627	carcass search	100-m road and pad	scavenged
18-Aug-22	eastern red bat	43	48	carcass search	70-m cleared plot	scavenged
18-Aug-22	eastern red bat	27	238	carcass search	70-m uncleared plot	intact
18-Aug-22	eastern red bat	26	240	carcass search	70-m uncleared plot	intact
18-Aug-22	eastern red bat	50	332	carcass search	70-m uncleared plot	scavenged
18-Aug-22	eastern red bat	16	359	carcass search	70-m uncleared plot	scavenged
18-Aug-22	eastern red bat	35	359	carcass search	70-m uncleared plot	scavenged
19-Aug-22	big brown bat	9	305	carcass search	70-m uncleared plot	intact
19-Aug-22	hoary bat	48	603	carcass search	70-m cleared plot	scavenged
19-Aug-22	hoary bat	43	603	carcass search	70-m cleared plot	scavenged
19-Aug-22	eastern red bat	12	610	carcass search	70-m uncleared plot	scavenged
19-Aug-22	eastern red bat	26	623	carcass search	70-m cleared plot	scavenged
19-Aug-22	eastern red bat	19	658	carcass search	70-m cleared plot	scavenged
19-Aug-22	eastern red bat	16	659	carcass search	70-m uncleared plot	scavenged
19-Aug-22	eastern red bat	29	659	carcass search	70-m uncleared plot	scavenged
22-Aug-22	eastern red bat	43	22	carcass search	70-m uncleared plot	intact
22-Aug-22	eastern red bat	42	48	carcass search	70-m cleared plot	scavenged
22-Aug-22	eastern red bat	47	58	carcass search	70-m cleared plot	scavenged
22-Aug-22	eastern red bat	14	58	carcass search	70-m cleared plot	scavenged
22-Aug-22	eastern red bat	11	116	carcass search	100-m road and pad	scavenged
22-Aug-22	eastern red bat	0	211	carcass search	100-m road and pad	scavenged
23-Aug-22	eastern red bat	30	110	carcass search	70-m cleared plot	scavenged
23-Aug-22	eastern red bat	24	110	carcass search	70-m cleared plot	scavenged
23-Aug-22	hoary bat	40	231	carcass search	70-m uncleared plot	scavenged
23-Aug-22	hoary bat	46	329	carcass search	100-m road and pad	scavenged
23-Aug-22	big brown bat	15	510	carcass search	70-m cleared plot	scavenged
23-Aug-22	eastern red bat	21	522	carcass search	70-m uncleared plot	scavenged
24-Aug-22	eastern red bat	28	424	carcass search	100-m road and pad	scavenged
24-Aug-22	big brown bat	28	442	carcass search	100-m road and pad	scavenged
25-Aug-22	eastern red bat	10	238	carcass search	70-m uncleared plot	scavenged
25-Aug-22	eastern red bat	13	241	carcass search	70-m cleared plot	scavenged
25-Aug-22	eastern red bat	24	332	carcass search	70-m uncleared plot	scavenged
25-Aug-22	hoary bat	28	332	carcass search	70-m uncleared plot	scavenged
25-Aug-22	eastern red bat	28	359	carcass search	70-m uncleared plot	scavenged
26-Aug-22	big brown bat	31	658	carcass search	70-m cleared plot	scavenged

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
26-Aug-22	eastern red bat	19	658	carcass search	70-m cleared plot	scavenged
29-Aug-22	eastern red bat	37	59	carcass search	100-m road and pad	scavenged
29-Aug-22	hoary bat	0	83	carcass search	100-m road and pad	scavenged
30-Aug-22	eastern red bat	44	8	carcass search	70-m uncleared plot	scavenged
30-Aug-22	eastern red bat	29	31	carcass search	70-m cleared plot	scavenged
30-Aug-22	eastern red bat	44	48	carcass search	70-m cleared plot	scavenged
30-Aug-22	eastern red bat	17	50	carcass search	70-m uncleared plot	scavenged
30-Aug-22	hoary bat	37	211	carcass search	100-m road and pad	scavenged
30-Aug-22	hoary bat	19	239	carcass search	100-m road and pad	scavenged
30-Aug-22	hoary bat	32	406	carcass search*	70-m uncleared plot	scavenged
30-Aug-22	silver-haired bat	0	510	carcass search	70-m cleared plot	injured
30-Aug-22	eastern red bat	13	549	carcass search	70-m cleared plot	scavenged
31-Aug-22	eastern red bat	53	68	carcass search	70-m cleared plot	scavenged
31-Aug-22	eastern red bat	40	68	carcass search	70-m cleared plot	scavenged
31-Aug-22	eastern red bat	16	68	carcass search	70-m cleared plot	scavenged
31-Aug-22	big brown bat	15	106	carcass search	70-m cleared plot	scavenged
31-Aug-22	eastern red bat	67	110	carcass search	70-m cleared plot	scavenged
31-Aug-22	eastern red bat	19	110	carcass search	70-m cleared plot	scavenged
31-Aug-22	big brown bat	48	226	carcass search	100-m road and pad	scavenged
31-Aug-22	hoary bat	23	230	carcass search	70-m cleared plot	scavenged
31-Aug-22	hoary bat	28	231	carcass search	70-m uncleared plot	scavenged
31-Aug-22	silver-haired bat	35	347	carcass search	100-m road and pad	intact
31-Aug-22	silver-haired bat	52	440	carcass search	100-m road and pad	injured
01-Sep-22	eastern red bat	34	312	carcass search	70-m cleared plot	intact
01-Sep-22	eastern red bat	26	312	carcass search	70-m cleared plot	intact
01-Sep-22	eastern red bat	34	312	carcass search	70-m cleared plot	intact
01-Sep-22	silver-haired bat	18	312	carcass search	70-m cleared plot	intact
01-Sep-22	hoary bat	37	406	carcass search	70-m cleared plot	scavenged
02-Sep-22	eastern red bat	10	241	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	5	241	carcass search	70-m cleared plot	intact
02-Sep-22	eastern red bat	27	420	carcass search	70-m uncleared plot	scavenged
02-Sep-22	eastern red bat	61	445	carcass search	70-m cleared plot	scavenged
02-Sep-22	eastern red bat	49	445	carcass search	70-m cleared plot	scavenged
02-Sep-22	silver-haired bat	43	445	carcass search	70-m cleared plot	scavenged
02-Sep-22	silver-haired bat	27	445	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	36	445	carcass search	70-m cleared plot	intact

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
02-Sep-22	silver-haired bat	19	445	carcass search	70-m cleared plot	intact
02-Sep-22	eastern red bat	28	603	carcass search	70-m cleared plot	intact
02-Sep-22	eastern red bat	11	603	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	23	603	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	19	603	carcass search	70-m cleared plot	intact
02-Sep-22	eastern red bat	37	610	carcass search	70-m uncleared plot	intact
02-Sep-22	silver-haired bat	59	610	carcass search	70-m uncleared plot	intact
02-Sep-22	silver-haired bat	15	610	carcass search	70-m uncleared plot	intact
02-Sep-22	silver-haired bat	67	610	carcass search	70-m uncleared plot	intact
02-Sep-22	silver-haired bat	67	610	carcass search	70-m uncleared plot	intact
02-Sep-22	silver-haired bat	45	610	carcass search	70-m uncleared plot	intact
02-Sep-22	big brown bat	0	623	carcass search	70-m cleared plot	intact
02-Sep-22	eastern red bat	26	623	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	35	623	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	25	656	carcass search*	100-m road and pad	intact
02-Sep-22	eastern red bat	54	658	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	34	658	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	18	658	carcass search	70-m cleared plot	intact
02-Sep-22	silver-haired bat	9	659	carcass search	70-m uncleared plot	intact
02-Sep-22	silver-haired bat	22	659	carcass search	70-m uncleared plot	intact
05-Sep-22	eastern red bat	27	100	carcass search	100-m road and pad	intact
05-Sep-22	eastern red bat	6	114	carcass search	100-m road and pad	injured
05-Sep-22	eastern red bat	18	114	carcass search	100-m road and pad	scavenged
05-Sep-22	eastern red bat	17	210	carcass search	100-m road and pad	scavenged
05-Sep-22	eastern red bat	40	510	carcass search	70-m cleared plot	scavenged
05-Sep-22	silver-haired bat	62	510	carcass search	70-m cleared plot	scavenged
06-Sep-22	eastern red bat	26	48	carcass search	70-m cleared plot	intact
06-Sep-22	hoary bat	41	48	carcass search	70-m cleared plot	intact
06-Sep-22	silver-haired bat	41	48	carcass search	70-m cleared plot	intact
06-Sep-22	big brown bat	51	50	carcass search	70-m uncleared plot	intact
06-Sep-22	big brown bat	36	50	carcass search	70-m uncleared plot	intact
06-Sep-22	eastern red bat	47	52	carcass search	70-m uncleared plot	intact
06-Sep-22	eastern red bat	31	52	carcass search	70-m uncleared plot	intact
06-Sep-22	hoary bat	46	52	carcass search	70-m uncleared plot	intact
06-Sep-22	hoary bat	34	52	carcass search*	70-m uncleared plot	scavenged
06-Sep-22	hoary bat	50	58	carcass search	70-m cleared plot	intact

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
06-Sep-22	big brown bat	35	314	carcass search	100-m road and pad	scavenged
06-Sep-22	big brown bat	34	427	carcass search*	100-m road and pad	dismembered
06-Sep-22	silver-haired bat	20	502	carcass search	100-m road and pad	dismembered
06-Sep-22	eastern red bat	39	542	carcass search	70-m cleared plot	scavenged
06-Sep-22	eastern red bat	38	603	carcass search*	70-m uncleared plot	intact
06-Sep-22	eastern red bat	9	659	carcass search*	70-m cleared plot	intact
07-Sep-22	eastern red bat	41	68	carcass search	70-m cleared plot	scavenged
07-Sep-22	silver-haired bat	42	68	carcass search	70-m cleared plot	scavenged
07-Sep-22	eastern red bat	39	69	carcass search	70-m uncleared plot	intact
07-Sep-22	eastern red bat	11	69	carcass search	70-m uncleared plot	intact
07-Sep-22	hoary bat	31	79	carcass search	70-m uncleared plot	intact
07-Sep-22	eastern red bat	32	106	carcass search	70-m cleared plot	scavenged
07-Sep-22	eastern red bat	39	106	carcass search	70-m cleared plot	scavenged
07-Sep-22	silver-haired bat	27	106	carcass search	70-m cleared plot	scavenged
07-Sep-22	silver-haired bat	15	106	carcass search	70-m cleared plot	scavenged
07-Sep-22	eastern red bat	31	110	carcass search	70-m cleared plot	intact
07-Sep-22	silver-haired bat	41	110	carcass search	70-m cleared plot	intact
07-Sep-22	hoary bat	22	345	carcass search	100-m road and pad	scavenged
07-Sep-22	eastern red bat	67	347	carcass search	100-m road and pad	scavenged
07-Sep-22	eastern red bat	5	446	carcass search	100-m road and pad	scavenged
07-Sep-22	silver-haired bat	9	446	carcass search	100-m road and pad	scavenged
07-Sep-22	eastern red bat	14	627	carcass search	100-m road and pad	scavenged
08-Sep-22	hoary bat	25	405	carcass search	70-m uncleared plot	scavenged
08-Sep-22	silver-haired bat	45	406	carcass search	70-m cleared plot	scavenged
08-Sep-22	silver-haired bat	10	646	carcass search	100-m road and pad	scavenged
09-Sep-22	eastern red bat	41	312	carcass search	70-m cleared plot	scavenged
09-Sep-22	eastern red bat	27	445	carcass search	70-m cleared plot	scavenged
09-Sep-22	eastern red bat	60	445	carcass search	70-m cleared plot	scavenged
09-Sep-22	silver-haired bat	25	445	carcass search	70-m cleared plot	scavenged
09-Sep-22	eastern red bat	43	658	carcass search	70-m cleared plot	scavenged
12-Sep-22	silver-haired bat	42	58	carcass search	70-m cleared plot	scavenged
12-Sep-22	eastern red bat	5	83	carcass search	100-m road and pad	scavenged
13-Sep-22	silver-haired bat	47	68	carcass search	70-m cleared plot	intact
13-Sep-22	silver-haired bat	22	210	carcass search	100-m road and pad	intact
13-Sep-22	eastern red bat	20	230	carcass search	70-m cleared plot	scavenged
13-Sep-22	silver-haired bat	14	502	carcass search	100-m road and pad	intact

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
13-Sep-22	silver-haired bat	5	528	carcass search	100-m road and pad	intact
13-Sep-22	big brown bat	36	539	carcass search	100-m road and pad	scavenged
13-Sep-22	eastern red bat	18	542	carcass search	70-m cleared plot	scavenged
13-Sep-22	silver-haired bat	28	542	carcass search	70-m cleared plot	intact
14-Sep-22	silver-haired bat	3	226	carcass search	100-m road and pad	scavenged
14-Sep-22	silver-haired bat	70	602	carcass search	100-m road and pad	scavenged
14-Sep-22	silver-haired bat	14	646	carcass search	100-m road and pad	scavenged
14-Sep-22	silver-haired bat	25	646	carcass search	100-m road and pad	scavenged
14-Sep-22	silver-haired bat	48	646	carcass search	100-m road and pad	scavenged
14-Sep-22	silver-haired bat	30	649	carcass search	100-m road and pad	scavenged
15-Sep-22	silver-haired bat	1	106	carcass search	70-m cleared plot	scavenged
16-Sep-22	eastern red bat	27	420	carcass search	70-m uncleared plot	scavenged
16-Sep-22	silver-haired bat	46	445	carcass search	70-m cleared plot	scavenged
16-Sep-22	silver-haired bat	50	603	carcass search	70-m cleared plot	scavenged
16-Sep-22	eastern red bat	13	610	carcass search	70-m uncleared plot	scavenged
16-Sep-22	silver-haired bat	29	610	carcass search	70-m uncleared plot	scavenged
16-Sep-22	eastern red bat	45	658	carcass search	70-m cleared plot	scavenged
16-Sep-22	eastern red bat	1	658	carcass search	70-m cleared plot	scavenged
16-Sep-22	silver-haired bat	4	658	carcass search	70-m cleared plot	intact
16-Sep-22	hoary bat	16	659	carcass search	70-m uncleared plot	scavenged
16-Sep-22	silver-haired bat	39	659	carcass search	70-m uncleared plot	intact
18-Sep-22	silver-haired bat	25	510	carcass search	70-m cleared plot	scavenged
19-Sep-22	hoary bat	44	48	carcass search	70-m cleared plot	scavenged
19-Sep-22	silver-haired bat	41	48	carcass search	70-m cleared plot	scavenged
19-Sep-22	silver-haired bat	22	48	carcass search	70-m cleared plot	scavenged
19-Sep-22	silver-haired bat	35	48	carcass search	70-m cleared plot	scavenged
19-Sep-22	silver-haired bat	5	58	carcass search	70-m cleared plot	scavenged
19-Sep-22	silver-haired bat	6	83	carcass search	100-m road and pad	scavenged
19-Sep-22	silver-haired bat	14	104	carcass search	100-m road and pad	scavenged
19-Sep-22	silver-haired bat	30	542	carcass search	70-m cleared plot	scavenged
20-Sep-22	eastern red bat	28	68	carcass search	70-m cleared plot	scavenged
20-Sep-22	silver-haired bat	23	68	carcass search	70-m cleared plot	scavenged
20-Sep-22	silver-haired bat	39	106	carcass search	70-m cleared plot	scavenged
20-Sep-22	silver-haired bat	37	110	carcass search	70-m cleared plot	scavenged
20-Sep-22	silver-haired bat	42	110	carcass search	70-m cleared plot	scavenged
20-Sep-22	silver-haired bat	34	210	carcass search	100-m road and pad	scavenged

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
20-Sep-22	silver-haired bat	51	230	carcass search	70-m cleared plot	scavenged
20-Sep-22	silver-haired bat	59	231	carcass search	70-m uncleared plot	scavenged
20-Sep-22	eastern red bat	75	239	carcass search	100-m road and pad	scavenged
20-Sep-22	hoary bat	5	258	carcass search	100-m road and pad	scavenged
20-Sep-22	silver-haired bat	5	529	carcass search	100-m road and pad	scavenged
20-Sep-22	eastern red bat	40	539	carcass search	100-m road and pad	scavenged
21-Sep-22	eastern red bat	23	440	carcass search	100-m road and pad	intact
21-Sep-22	silver-haired bat	35	440	carcass search	100-m road and pad	intact
21-Sep-22	silver-haired bat	1	646	carcass search	100-m road and pad	scavenged
22-Sep-22	silver-haired bat	44	241	carcass search	70-m cleared plot	scavenged
22-Sep-22	silver-haired bat	70	241	carcass search	70-m cleared plot	scavenged
22-Sep-22	eastern red bat	49	420	carcass search	70-m uncleared plot	scavenged
23-Sep-22	eastern red bat	47	603	carcass search	70-m cleared plot	scavenged
23-Sep-22	silver-haired bat	29	603	carcass search	70-m cleared plot	dismembered
23-Sep-22	silver-haired bat	34	610	carcass search	70-m uncleared plot	scavenged
23-Sep-22	silver-haired bat	63	658	carcass search	70-m cleared plot	scavenged
23-Sep-22	silver-haired bat	18	658	carcass search	70-m cleared plot	scavenged
23-Sep-22	silver-haired bat	32	659	carcass search	70-m uncleared plot	scavenged
26-Sep-22	eastern red bat	27	8	carcass search	70-m uncleared plot	scavenged
26-Sep-22	hoary bat	25	22	carcass search	70-m uncleared plot	scavenged
26-Sep-22	silver-haired bat	46	48	carcass search	70-m cleared plot	scavenged
26-Sep-22	silver-haired bat	34	50	carcass search	70-m uncleared plot	scavenged
26-Sep-22	eastern red bat	44	58	carcass search	70-m cleared plot	scavenged
26-Sep-22	silver-haired bat	22	58	carcass search	70-m cleared plot	dismembered
26-Sep-22	silver-haired bat	54	96	carcass search	100-m road and pad	scavenged
27-Sep-22	silver-haired bat	19	230	carcass search*	70-m uncleared plot	scavenged
27-Sep-22	silver-haired bat	42	231	carcass search	70-m uncleared plot	scavenged
27-Sep-22	silver-haired bat	39	314	carcass search	100-m road and pad	intact
27-Sep-22	eastern red bat	63	510	carcass search	70-m cleared plot	intact
27-Sep-22	silver-haired bat	30	510	carcass search	70-m cleared plot	dismembered
27-Sep-22	silver-haired bat	0	528	carcass search	100-m road and pad	injured
27-Sep-22	silver-haired bat	22	533	carcass search	100-m road and pad	scavenged
27-Sep-22	silver-haired bat	44	549	carcass search	70-m cleared plot	scavenged
29-Sep-22	silver-haired bat	19	230	carcass search	70-m cleared plot	dismembered
29-Sep-22	unidentified Lasiurus bat	46	405	carcass search	70-m uncleared plot	scavenged
29-Sep-22	silver-haired bat	37	406	carcass search	70-m cleared plot	scavenged

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
30-Sep-22	eastern red bat	70	305	carcass search	70-m uncleared plot	scavenged
30-Sep-22	silver-haired bat	47	603	carcass search	70-m cleared plot	scavenged
30-Sep-22	silver-haired bat	37	610	carcass search	70-m uncleared plot	scavenged
30-Sep-22	silver-haired bat	43	610	carcass search	70-m uncleared plot	scavenged
30-Sep-22	silver-haired bat	43	623	carcass search	70-m cleared plot	scavenged
30-Sep-22	silver-haired bat	53	659	carcass search	70-m uncleared plot	scavenged
30-Sep-22	silver-haired bat	31	659	carcass search	70-m uncleared plot	scavenged
03-Oct-22	silver-haired bat	46	510	carcass search	70-m cleared plot	scavenged
03-Oct-22	silver-haired bat	31	510	carcass search	70-m cleared plot	scavenged
03-Oct-22	silver-haired bat	73	522	carcass search*	70-m uncleared plot	scavenged
03-Oct-22	silver-haired bat	50	522	carcass search	70-m uncleared plot	scavenged
03-Oct-22	silver-haired bat	58	549	carcass search	70-m cleared plot	scavenged
04-Oct-22	hoary bat	47	58	carcass search	70-m cleared plot	intact
04-Oct-22	silver-haired bat	36	241	carcass search	70-m cleared plot	scavenged
04-Oct-22	silver-haired bat	79	542	carcass search*	70-m cleared plot	feather spot
05-Oct-22	silver-haired bat	17	332	carcass search	70-m uncleared plot	scavenged
06-Oct-22	silver-haired bat	36	406	carcass search	70-m cleared plot	scavenged
06-Oct-22	silver-haired bat	64	406	carcass search	70-m cleared plot	scavenged
07-Oct-22	eastern red bat	46	420	carcass search	70-m uncleared plot	scavenged
07-Oct-22	silver-haired bat	54	610	carcass search	70-m uncleared plot	scavenged
07-Oct-22	silver-haired bat	44	623	carcass search	70-m cleared plot	intact
07-Oct-22	silver-haired bat	14	623	carcass search	70-m cleared plot	dismembered
07-Oct-22	silver-haired bat	7	623	carcass search	70-m cleared plot	dismembered
07-Oct-22	silver-haired bat	58	658	carcass search	70-m cleared plot	scavenged
07-Oct-22	unidentified Lasiurus bat	25	658	carcass search	70-m cleared plot	scavenged
10-Oct-22	eastern red bat	36	50	carcass search	70-m uncleared plot	scavenged
10-Oct-22	unidentified bat	65	510	carcass search	70-m cleared plot	scavenged
10-Oct-22	eastern red bat	48	522	carcass search	70-m uncleared plot	scavenged
10-Oct-22	silver-haired bat	45	549	carcass search	70-m cleared plot	scavenged
12-Oct-22	eastern red bat	49	68	carcass search	70-m cleared plot	scavenged
12-Oct-22	silver-haired bat	25	79	carcass search	70-m uncleared plot	scavenged
13-Oct-22	silver-haired bat	56	405	carcass search	70-m uncleared plot	scavenged
13-Oct-22	silver-haired bat	16	406	carcass search	70-m cleared plot	scavenged
13-Oct-22	eastern red bat	71	445	carcass search*	70-m cleared plot	scavenged
14-Oct-22	silver-haired bat	18	305	carcass search	70-m uncleared plot	scavenged
14-Oct-22	eastern red bat	85	610	carcass search*	70-m uncleared plot	scavenged

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
14-Oct-22	eastern red bat	55	623	carcass search	70-m cleared plot	scavenged
14-Oct-22	silver-haired bat	54	659	carcass search	70-m uncleared plot	scavenged
Bird Carcasses						
06-Apr-22	sharp-shinned hawk	5	225	carcass search	100-m road and pad	feather spot
06-Apr-22	unidentified small bird	100	341	carcass search*	100-m road and pad	feather spot
20-Apr-22	unidentified passerine	83	545	carcass search	100-m road and pad	scavenged
02-May-22	red-tailed hawk	53	39	carcass search*	100-m road and pad	scavenged
02-May-22	ruby-crowned kinglet	50	71	carcass search	100-m road and pad	scavenged
03-May-22	tree swallow	21	238	carcass search	100-m road and pad	scavenged
01-Jun-22	mallard	123	32	carcass search**	100-m road and pad	dismembered
08-Jun-22	turkey vulture	80	651	carcass search*	N/A	scavenged
01-Aug-22	killdeer	3	89	carcass search	100-m road and pad	feather spot
02-Aug-22	cliff swallow	30	69	carcass search	70-m uncleared plot	intact
02-Aug-22	unidentified passerine	25	69	carcass search	70-m uncleared plot	scavenged
03-Aug-22	killdeer	12	333	carcass search	70-m cleared plot	scavenged
03-Aug-22	mourning dove	4	424	carcass search	100-m road and pad	feather spot
03-Aug-22	mourning dove	0	620	carcass search	100-m road and pad	intact
03-Aug-22	loggerhead shrike	20	627	carcass search	100-m road and pad	feather spot
05-Aug-22	cliff swallow	25	610	carcass search	70-m uncleared plot	intact
09-Aug-22	killdeer	31	69	carcass search	70-m uncleared plot	feather spot
09-Aug-22	unidentified dove	30	106	carcass search	70-m cleared plot	feather spot
10-Aug-22	horned lark	83	347	carcass search	100-m road and pad	feather spot
10-Aug-22	mourning dove	2	424	carcass search	100-m road and pad	scavenged
10-Aug-22	mourning dove	1	440	carcass search	100-m road and pad	scavenged
10-Aug-22	killdeer	31	602	carcass search*	100-m road and pad	scavenged
15-Aug-22	mourning dove	82	3	carcass search*	100-m road and pad	feather spot
17-Aug-22	mourning dove	1	440	carcass search	100-m road and pad	scavenged
19-Aug-22	horned lark	50	658	carcass search	70-m cleared plot	scavenged
19-Aug-22	killdeer	52	658	carcass search	70-m cleared plot	scavenged
22-Aug-22	killdeer	64	58	carcass search	70-m cleared plot	feather spot
22-Aug-22	purple martin	2	89	carcass search	100-m road and pad	scavenged
23-Aug-22	European starling	34	69	carcass search	70-m uncleared plot	dismembered
25-Aug-22	killdeer	101	332	carcass search*	70-m uncleared plot	feather spot
25-Aug-22	unidentified small bird	30	332	carcass search	70-m uncleared plot	feather spot
26-Aug-22	horned lark	1	445	carcass search	70-m cleared plot	scavenged
26-Aug-22	Cape May warbler	34	623	carcass search	70-m cleared plot	scavenged

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
30-Aug-22	gray catbird	4	48	carcass search	70-m cleared plot	feather spot
31-Aug-22	horned lark	14	22	carcass search	70-m uncleared plot	scavenged
01-Sep-22	unidentified small bird	44	406	carcass search	70-m cleared plot	scavenged
02-Sep-22	red-breasted nuthatch	47	610	carcass search	70-m uncleared plot	intact
02-Sep-22	red-eyed vireo	64	623	carcass search	70-m cleared plot	dismembered
06-Sep-22	mourning dove	32	48	carcass search	70-m cleared plot	feather spot
07-Sep-22	Seminole bat	36	230	carcass search	70-m cleared plot	intact
08-Sep-22	red-eyed vireo	34	646	carcass search	100-m road and pad	scavenged
13-Sep-22	red-eyed vireo	12	367	carcass search	100-m road and pad	scavenged
14-Sep-22	mourning dove	4	226	carcass search	100-m road and pad	scavenged
14-Sep-22	mourning dove	1	626	carcass search	100-m road and pad	intact
15-Sep-22	red-eyed vireo	43	209	carcass search	70-m cleared plot	scavenged
18-Sep-22	horned lark	28	549	carcass search	70-m cleared plot	feather spot
18-Sep-22	house sparrow	68	549	carcass search	70-m cleared plot	scavenged
19-Sep-22	rock pigeon	4	256	carcass search	100-m road and pad	feather spot
20-Sep-22	unidentified small bird	35	106	carcass search	70-m cleared plot	scavenged
20-Sep-22	unidentified small bird	60	230	carcass search	70-m cleared plot	scavenged
20-Sep-22	horned lark	12	518	carcass search	100-m road and pad	intact
20-Sep-22	horned lark	88	518	carcass search	100-m road and pad	scavenged
20-Sep-22	killdeer	94	529	carcass search	100-m road and pad	feather spot
23-Sep-22	unidentified warbler	34	623	carcass search	70-m cleared plot	scavenged
26-Sep-22	mourning dove	1	84	carcass search	100-m road and pad	intact
27-Sep-22	ruby-throated hummingbird	29	68	carcass search	70-m cleared plot	scavenged
27-Sep-22	red-eyed vireo	50	110	carcass search	70-m cleared plot	scavenged
27-Sep-22	horned lark	62	230	carcass search*	70-m cleared plot	scavenged
27-Sep-22	unidentified warbler	40	542	carcass search	70-m cleared plot	scavenged
29-Sep-22	horned lark	47	359	carcass search	70-m uncleared plot	scavenged
29-Sep-22	mourning dove	1	406	carcass search	70-m cleared plot	scavenged
03-Oct-22	mourning dove	50	48	carcass search	70-m cleared plot	injured
03-Oct-22	mourning dove	59	48	carcass search	70-m cleared plot	feather spot
04-Oct-22	ruby-crowned kinglet	36	518	carcass search	100-m road and pad	intact
04-Oct-22	unidentified passerine	23	542	carcass search	70-m cleared plot	scavenged
05-Oct-22	mourning dove	1	345	carcass search	100-m road and pad	scavenged
07-Oct-22	European starling	58	658	carcass search	70-m cleared plot	scavenged
10-Oct-22	unidentified kinglet	70	510	carcass search	70-m cleared plot	scavenged
13-Oct-22	golden-crowned kinglet	38	620	carcass search	100-m road and pad	intact

Appendix A. Carcasses found at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
14-Oct-22	unidentified small bird	63	610	carcass search	70-m uncleared plot	scavenged
14-Oct-22	unidentified passerine	30	623	carcass search	70-m cleared plot	scavenged
14-Oct-22	unidentified small bird	63	623	carcass search*	70-m cleared plot	scavenged

* Carcass was found outside search area or outside of regularly scheduled search.

m = meter.

Appendix B. Truncated Weighted Likelihood (TWL) Area Adjustment Model Fitting Results

Appendix B1. Number and percent (%) of bat carcasses found and total included in the area adjustment calculation for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

	Included in Area Adjustment		Outside Search Area[1]		Outside Study Period[1]		Total	
Species	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
eastern red bat	126	42.6	3	42.9	7	30.4	136	41.7
silver-haired bat	113	38.2	4	57.1	0	0	117	35.9
hoary bat	34	11.5	0	0	9	39.1	43	13.2
big brown bat	19	6.4	0	0	7	30.4	26	8.0
Lasiurus spp.	2	1.0	0	0	0	0	2	0.6
Seminole bat	1	0.3	0	0	0	0	1	0.3
unidentified bat[2]	1	0.3	0	0	0	0	1	0.3
Total	**296**	**100**	**7**	**100**	**23**	**100**	**326**	**100**

[1] Carcasses not included in analysis.

[2] This carcass was sent out for deoxyribonucleic acid (DNA) analysis but due to the decomposition of the sample, the lab was not able to obtain a genetic identification.

Sums may not equal totals shown due to rounding.

Appendix B2. Search area adjustment models for bats at 1.5-megawatt turbines with 38.5-meter blades from the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Distribution	AICc	Delta AICc
Weibull	1,562.86	0*
Gompertz	1,567.16	4.30
normal	1,568.18	5.32
gamma	1,569.52	6.67

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix B3. Search area adjustment models for bats at 1.5-megawatt turbines with 41-meter blades from the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Distribution	AICc	Delta AICc
Weibull	1,833.78	0*
Gompertz	1,836.12	2.34
normal	1,836.18	2.40
gamma	1,837.23	3.45

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix B4. Search area adjustment models for bats at 1.65-megawatt turbines with 41-meter blades from the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Distribution	AICc	Delta AICc
Gompertz	2,445.80	0*
normal	2,456.80	11.00
Weibull	2,487.20	41.40
gamma	2,542.53	96.73

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix B5. Search area adjustment models for bats at 2.0-megawatt turbines with 55-meter blades from the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Distribution	AICc	Delta AICc
normal	1,228.45	0*
Gompertz	1,232.66	4.20
Weibull	1,243.07	14.62
gamma	1,267.06	38.60

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix B6. Search area adjustment models for bats at 2.1-megawatt turbines with 44-meter blades from the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Distribution	AICc	Delta AICc
normal	1,250.42	0*
Weibull	1,250.96	0.53
Gompertz	1,261.32	10.90
gamma	1,265.89	15.46

* Selected model.

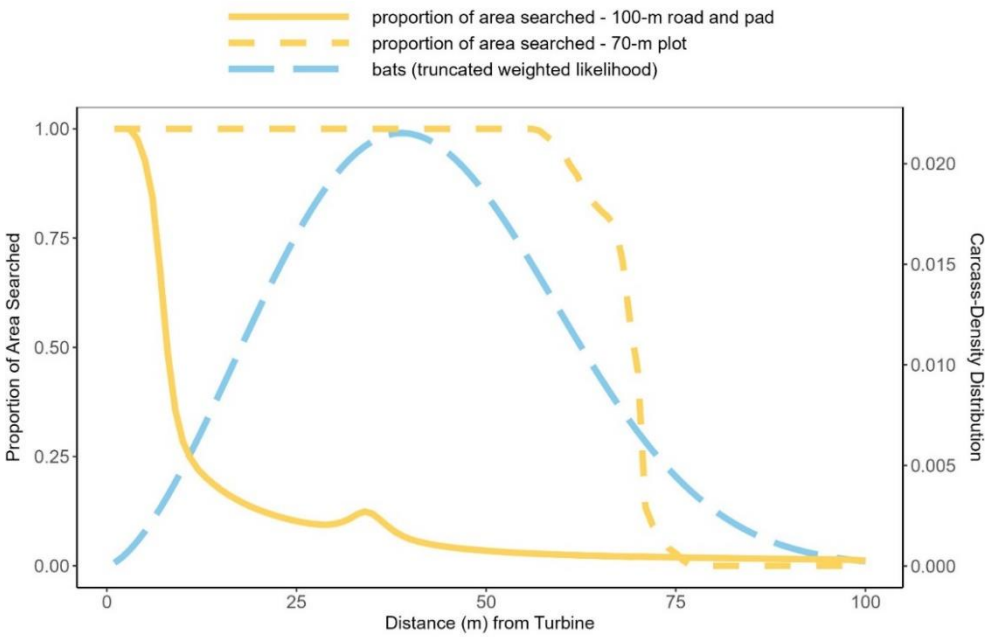
AICc = corrected Akaike Information Criterion.

Appendix B7. Search area adjustment models for bats at 3.6-megawatt turbines with 68-meter blades from the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

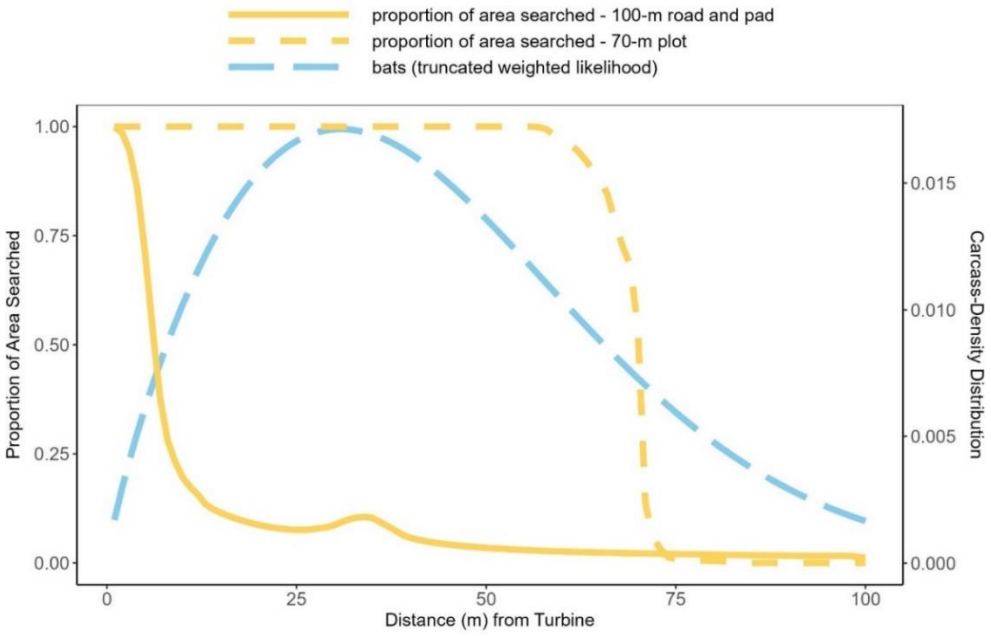
Distribution	AICc	Delta AICc
Gompertz	2,305.98	0*
normal	2,314.59	8.61
Weibull	2,329.86	23.88
gamma	2,348.94	42.96

* Selected model.

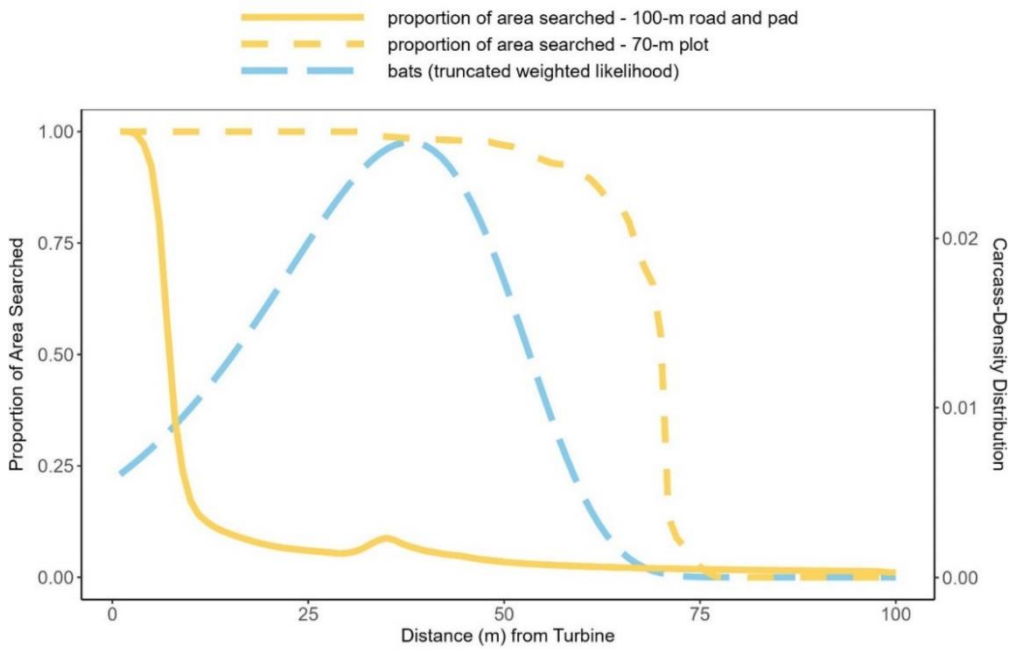
AICc = corrected Akaike Information Criterion.



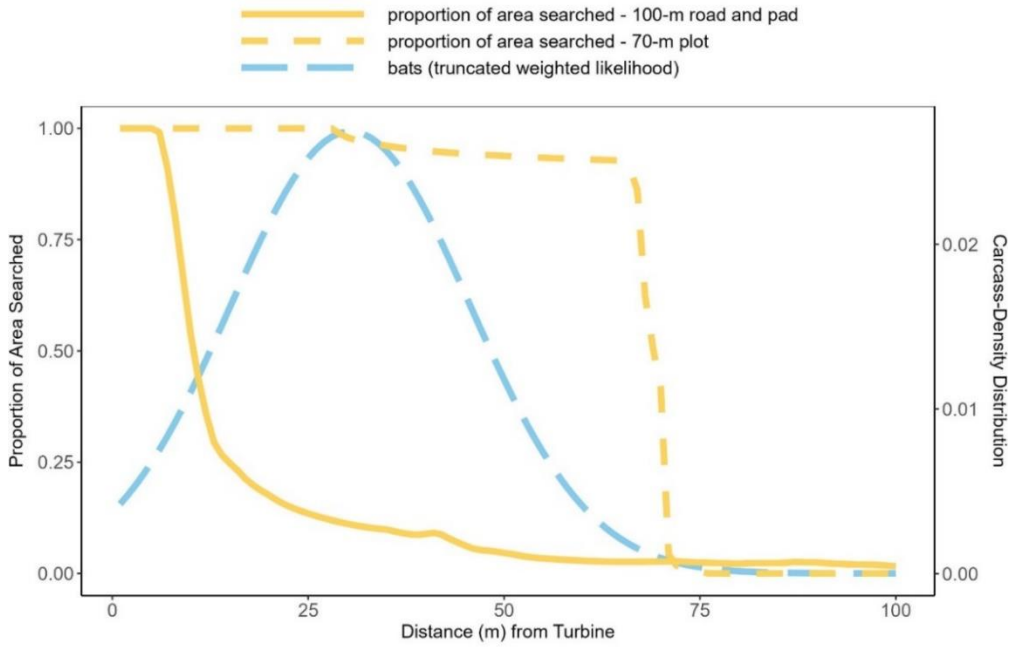
Appendix B8. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at 1.5-megawatt turbines with 38.5-m blades at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.



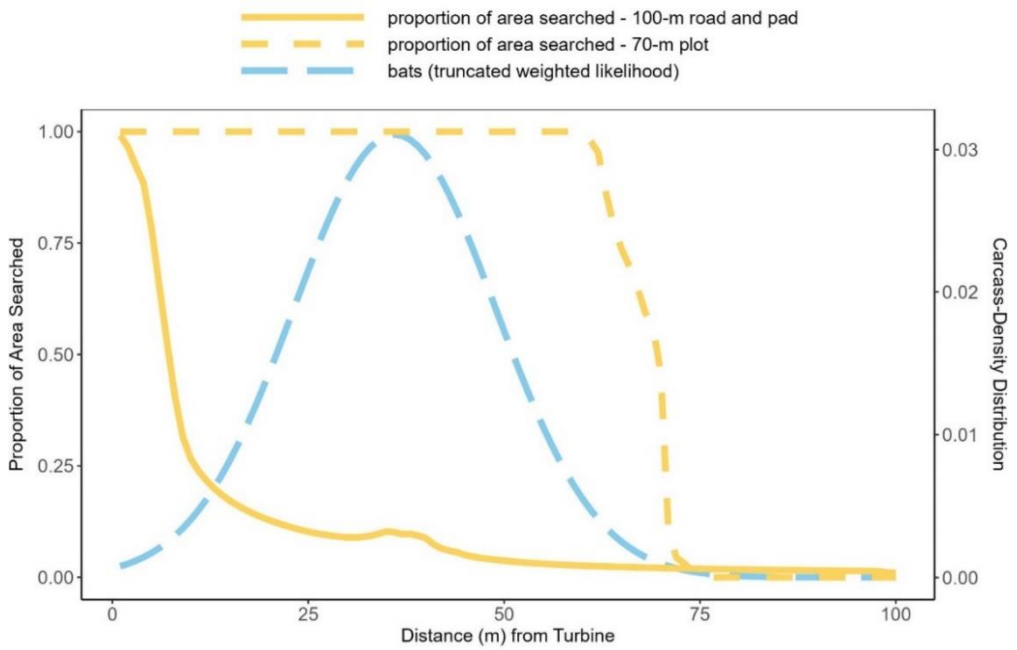
Appendix B9. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at 1.5-megawatt turbines with 41-m blades at the Meadow Lake Wind Resources Area, Benton and White Counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.



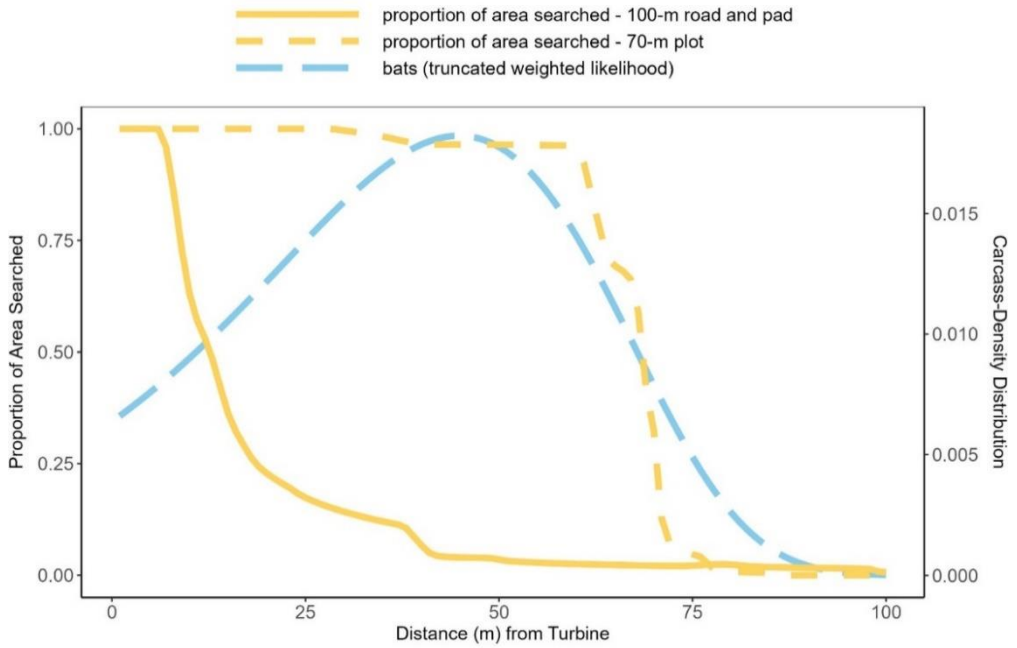
Appendix B10. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at 1.65-megawatt turbines at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.



Appendix B11. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at 2.0-megawatt turbines at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.



Appendix B12. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at 2.1-megawatt turbines at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.



Appendix B13. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at 3.6-megawatt turbines at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Appendix C. Searcher Efficiency and Carcass Persistence Model Fitting Results

Appendix C1. Searcher efficiency models for 70-meter cleared and uncleared plots at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Covariates	k Value	AICc	Delta AICc
No Covariates	0.67	70.00	0*
Plot Cover	0.67	70.04	0.04

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix C2. Searcher efficiency models for 100-meter road and pads at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Covariates	k Value	AICc	Delta AICc
No Covariates	0.67	18.96	0*
Season	0.67	21.12	2.16

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix C3. Carcass persistence models with covariates and distributions for bats at 70-meter cleared and uncleared plots at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022 (n = 27).

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	No Covariates	Weibull	110.84	0*
No Covariates	No Covariates	lognormal	111.38	0.54
No Covariates	No Covariates	log-logistic	111.46	0.62
No Covariates	PlotSearchTypeBT	Weibull	111.78	0.94
No Covariates	PlotSearchTypeBT	lognormal	112.60	1.76
No Covariates	PlotSearchTypeBT	log-logistic	112.82	1.98
PlotSearchTypeBT	No Covariates	Weibull	113.38	2.54
PlotSearchTypeBT	No Covariates	lognormal	113.74	2.90
PlotSearchTypeBT	No Covariates	log-logistic	113.76	2.92
PlotSearchTypeBT	PlotSearchTypeBT	Weibull	114.55	3.71
PlotSearchTypeBT	PlotSearchTypeBT	lognormal	115.18	4.34
PlotSearchTypeBT	PlotSearchTypeBT	log-logistic	115.33	4.49
No Covariates	-	exponential	121.58	10.74
PlotSearchTypeBT	-	exponential	123.92	13.08

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix C4. Carcass persistence models with covariates and distributions for bats at 100-meter road and pads at the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022 (n = 30).

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	-	exponential	135.60	0*
No Covariates	Season	log-logistic	137.38	1.78
No Covariates	No Covariates	Weibull	137.52	1.92
No Covariates	No Covariates	log-logistic	137.64	2.04
Season	-	exponential	137.67	2.07
No Covariates	Season	Weibull	137.95	2.35
Season	No Covariates	log-logistic	138.88	3.28
Season	Season	log-logistic	139.02	3.42
No Covariates	No Covariates	lognormal	139.09	3.49
No Covariates	Season	lognormal	139.70	4.10
Season	No Covariates	Weibull	139.76	4.16
Season	Season	Weibull	140.35	4.75
Season	No Covariates	lognormal	140.39	4.79
Season	Season	lognormal	141.45	5.85

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix C5. Carcass persistence top model with covariates, distributions, and model parameters for the Meadow Lake Wind Resources Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Plot Search Type	Distribution	Estimated Median Removal Times (days)	Parameter 1	Parameter 2
70-meter cleared and uncleared plots	Weibull[1]	6.55	shape = 0.4995	scale = 13.6399
100-meter road and pads	exponential[1, 2]	10.99	rate = 0.063	-

[1] Parameterization follows the base R parameterization for this distribution.

[2] The exponential distribution does not have a scale parameter.

Appendix D. Inputs for Single Class and Multiple Class Modules in Evidence of Absence

Appendix D1. Inputs needed to run Evidence of Absence: Single Class Module for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.[1]

						Searcher Efficiency		Carcass Persistence[2]	
Season	Plot Type	Blade Length (m)	Search Interval (I)	Number of Searches	Spatial Coverage (a)	Carcasses Available	Carcasses Found	Shape (α)	Scale (β)
spring	road/pad	38.5	14	4	0.0790	51	49	NA	15.863
		41.0	14	4	0.0827	51	49	NA	15.863
		41.0	14	4	0.1056	51	49	NA	15.863
		44.0	14	4	0.0912	51	49	NA	15.863
		55.0	14	4	0.1705	51	49	NA	15.863
		68.0	14	4	0.1650	51	49	NA	15.863
fall1	full plot	38.5	7	3	0.9116	53	35	0.5	13.640
		41.0	7	3	0.8458	53	35	0.5	13.640
		41.0	7	4	0.9829	53	35	0.5	13.640
		44.0	7	3	0.9905	53	35	0.5	13.640
		55.0	7	4	0.9669	53	35	0.5	13.640
		68.0	7	3	0.8894	53	35	0.5	13.640
fall1	road/pad	38.5	7	3	0.0790	51	49	NA	15.863
		41.0	7	3	0.0827	51	49	NA	15.863
		41.0	7	4	0.1056	51	49	NA	15.863
		44.0	7	3	0.0912	51	49	NA	15.863
		55.0	7	3	0.1705	51	49	NA	15.863
		68.0	7	3	0.1650	51	49	NA	15.863
fall2	full plot	38.5	7	9	0.9116	53	35	0.5	13.640
		41.0	7	9	0.8458	53	35	0.5	13.640
		41.0	7	10	0.9829	53	35	0.5	13.640
		44.0	7	10	0.9905	53	35	0.5	13.640
		55.0	7	9	0.9669	53	35	0.5	13.640
		68.0	7	10	0.8894	53	35	0.5	13.640
fall2	road/pad	38.5	7	10	0.0790	51	49	NA	15.863
		41.0	7	10	0.0827	51	49	NA	15.863
		41.0	7	9	0.1056	51	49	NA	15.863
		44.0	7	10	0.0912	51	49	NA	15.863
		55.0	7	10	0.1705	51	49	NA	15.863
		68.0	7	10	0.1650	51	49	NA	15.863

[1] was assumed to equal 0.67 for all strata, per Huso et al. (2017).

[2] An exponential distribution was used for carcass persistence on 100-meter (m) roads and pads. The 95% upper and lower confidence intervals on β were set to 10.62, 23.69. A Weibull distribution was used for carcass persistence on 70-m cleared and uncleared plots. The 95% upper and lower confidence intervals on β were set to 5.77, 32.37.

Appendix D2. Inputs needed to run Evidence of Absence model to combine across plot types within each season: Multiple Class Module for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Season	Plot Type	Blade Length (m)	Megawatts	Ba	Bb	Within-Season Sampling Fraction
spring	road/pad	38.5	1.50	141.1434	2671.4080	0.1261
		41.0	1.50	136.9352	2455.4170	0.1081
		41.0	1.65	138.8483	1914.8740	0.4054
		44.0	2.10	141.2043	2285.9600	0.0811
		55.0	2.00	121.1211	992.2262	0.1532
		68.0	3.60	119.7816	1024.8690	0.1261
fall1	full plot	38.5	1.50	31.7284	45.1875	0.0360
		41.0	1.50	32.4201	52.1600	0.0450
		41.0	1.65	31.0584	36.3535	0.0811
		44.0	2.10	30.1787	37.1503	0.0360
		55.0	2.00	30.1947	36.4841	0.0450
		68.0	3.60	32.4895	48.2316	0.0450
fall1	road/pad	38.5	1.50	391.5851	5963.4210	0.1261
		41.0	1.50	401.8934	5836.4080	0.1171
		41.0	1.65	407.0835	4542.1870	0.1892
		44.0	2.10	406.6906	5325.6790	0.0721
		55.0	2.00	352.9676	2305.7070	0.0721
		68.0	3.60	383.8206	2594.6310	0.0811
fall1	Unsearched*	NA	NA	0.0100	1000	0.0541
fall2	full plot	38.5	1.50	32.3240	40.2716	0.0541
		41.0	1.50	31.5981	44.9332	0.0541
		41.0	1.65	28.4753	30.5628	0.1081
		44.0	2.10	30.0974	31.5544	0.0360
		55.0	2.00	27.6178	30.9904	0.0450
		68.0	3.60	32.0014	41.2803	0.0450
fall2	road/pad	38.5	1.50	410.3237	6208.2160	0.1261
		41.0	1.50	363.4979	5279.4380	0.1171
		41.0	1.65	351.2448	3901.7450	0.1892
		44.0	2.10	407.1884	5254.3330	0.0721
		55.0	2.00	368.7740	2388.5020	0.0721
		68.0	3.60	362.3286	2440.4110	0.0811

* Six 70-m cleared turbines were unsearched during the period of August 1–August 15 due to the presence of standing corn.

m = meter.

Appendix D3. Inputs needed to run Evidence of Absence model to combine across seasons: Multiple Class Module for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

Season	Ba	Bb	Weights (DWP)
Spring (April 1 – May 15)	593.5297	7,420.364	0.11
Fall (August 1 – October 15)	1,101.9960	4,278.603	0.89

DWP = Density-weighted proportion.

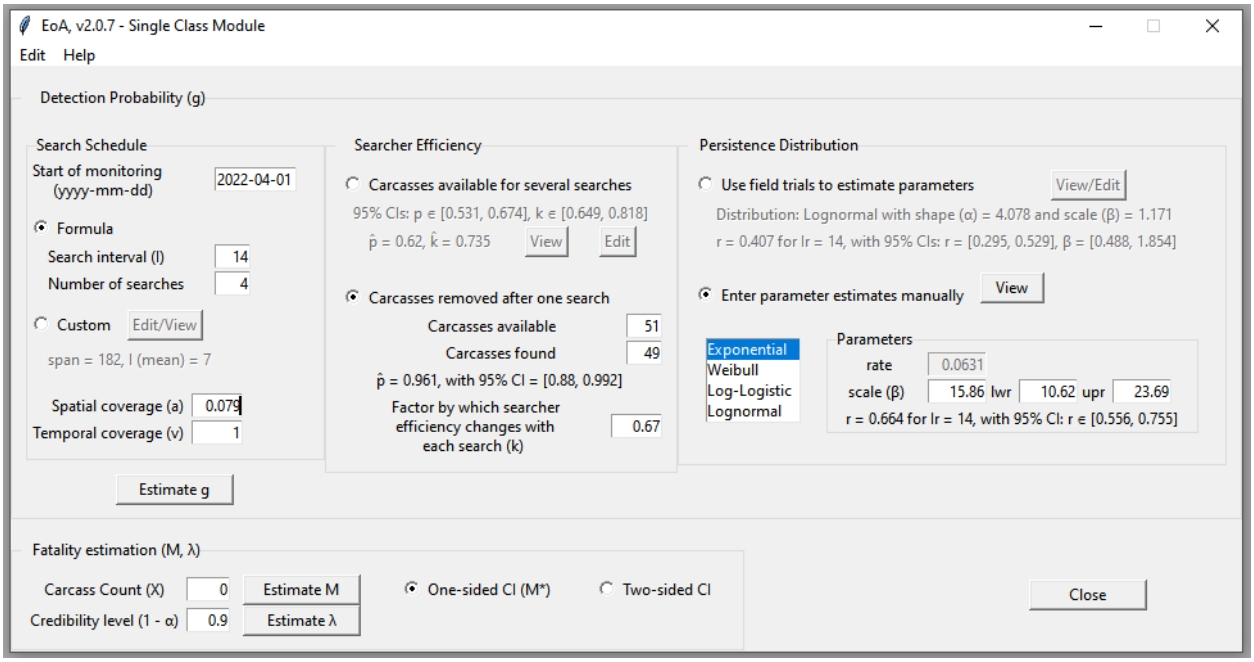
Appendix D4. Components of the site-wide *g* for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

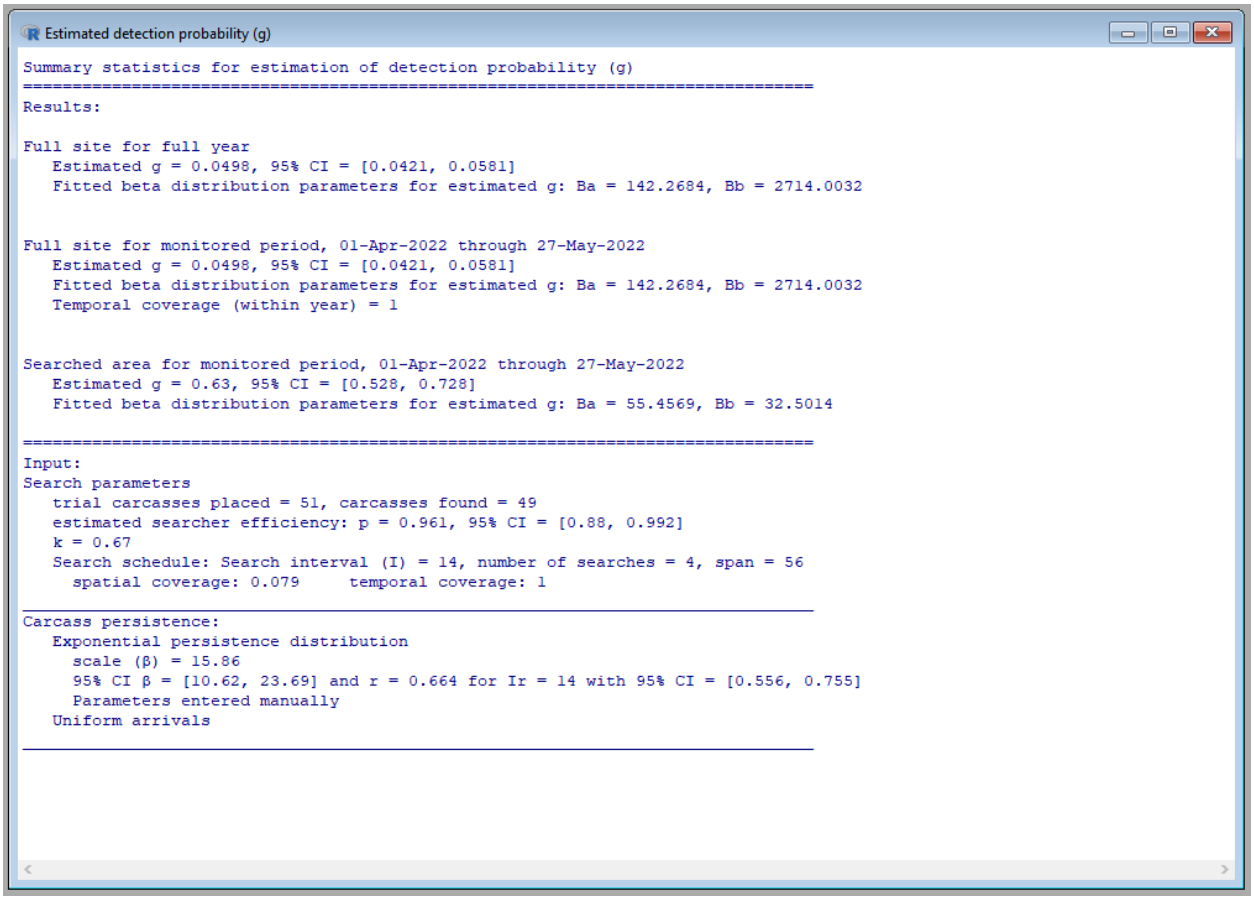
Turbines	Ba	Bb	Weights (DWP)	*g*	95% CI
111 (study turbines)	1,219.226	5,183.364	0.268116	0.190427	0.180903–0.200135
303 (unsearched turbines)	0.010	1000	0.731884	0.000010	0.00000–0.00004
414 (site-wide)	**1,425.284**	**26,486.51**	**N/A**	**0.051064**	**0.048512-0.053677**

DWP = Density-weighted proportion; CI = Confidence interval.

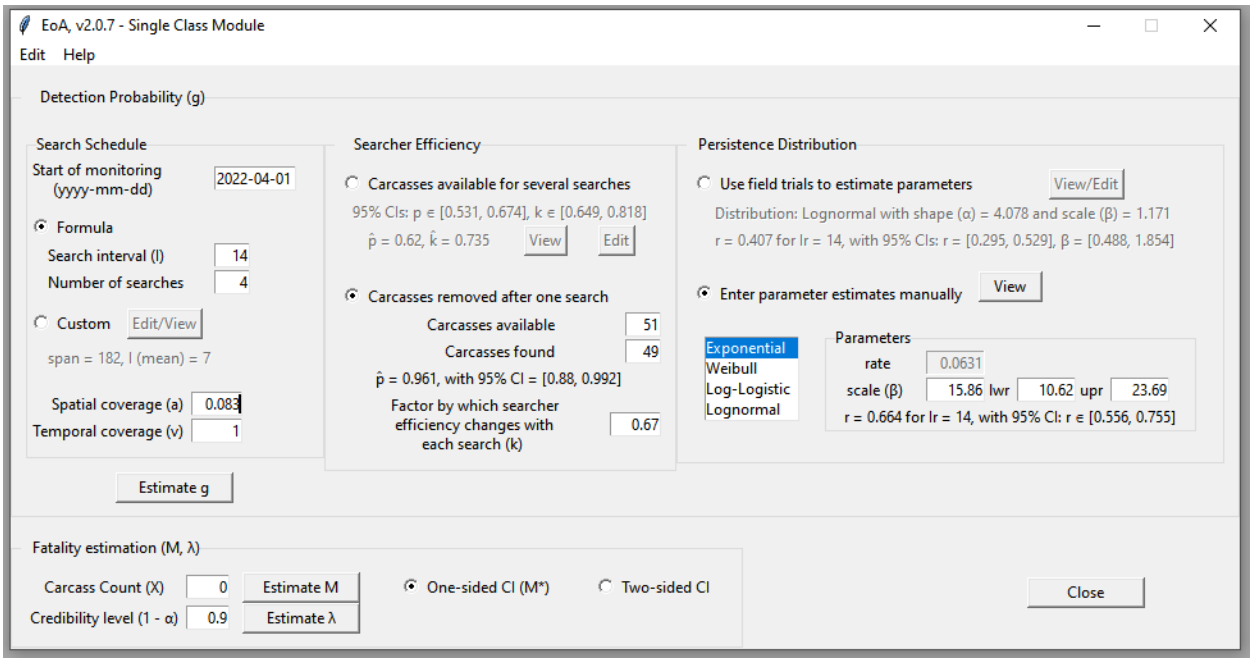
Appendix D5. Inputs needed to run Evidence of Absence model to combine across years: Multiple Years Module for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2022.

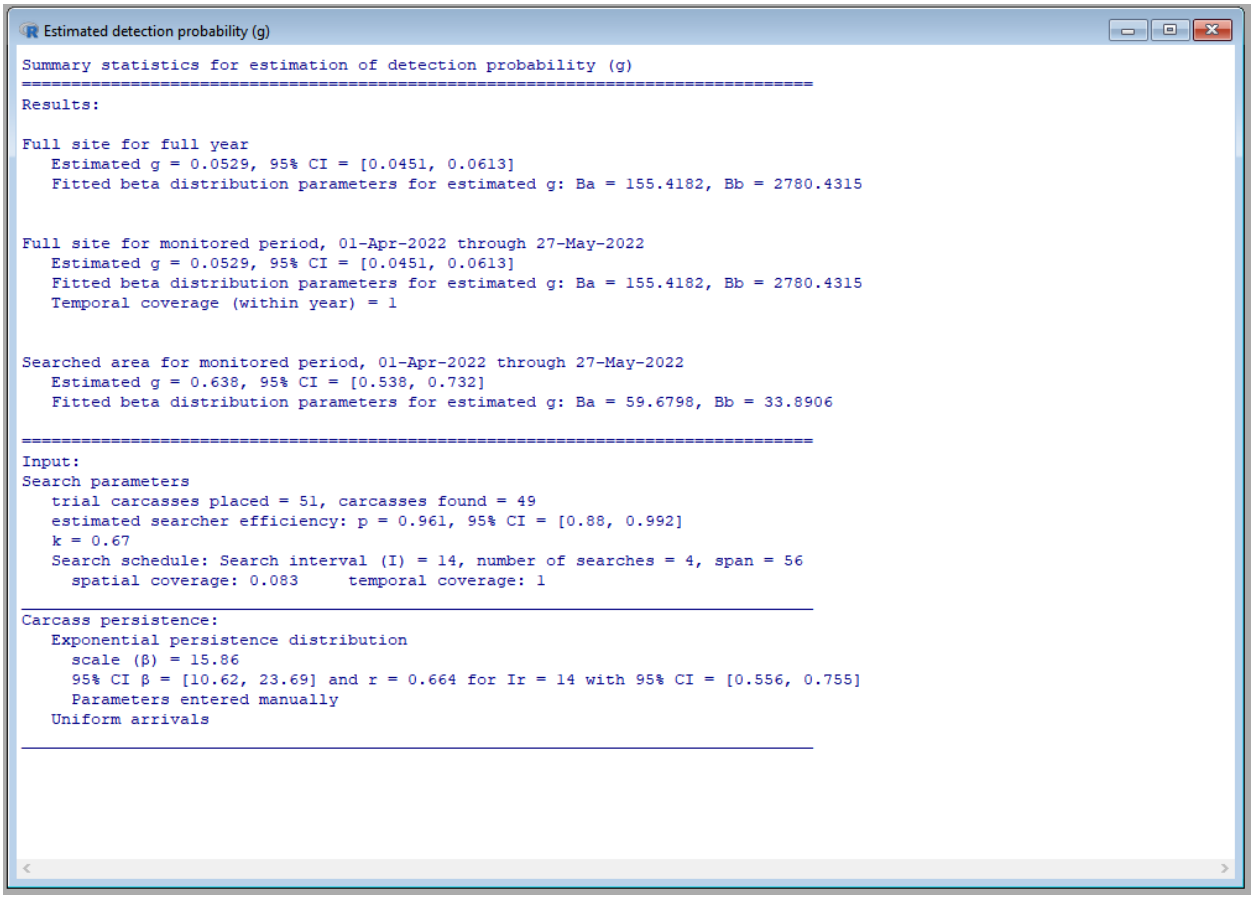
Year	Ba	Bb	Weights (ρ)
2021	1,605.220	15,648.77	1
2022	1,425.284	26,486.51	1



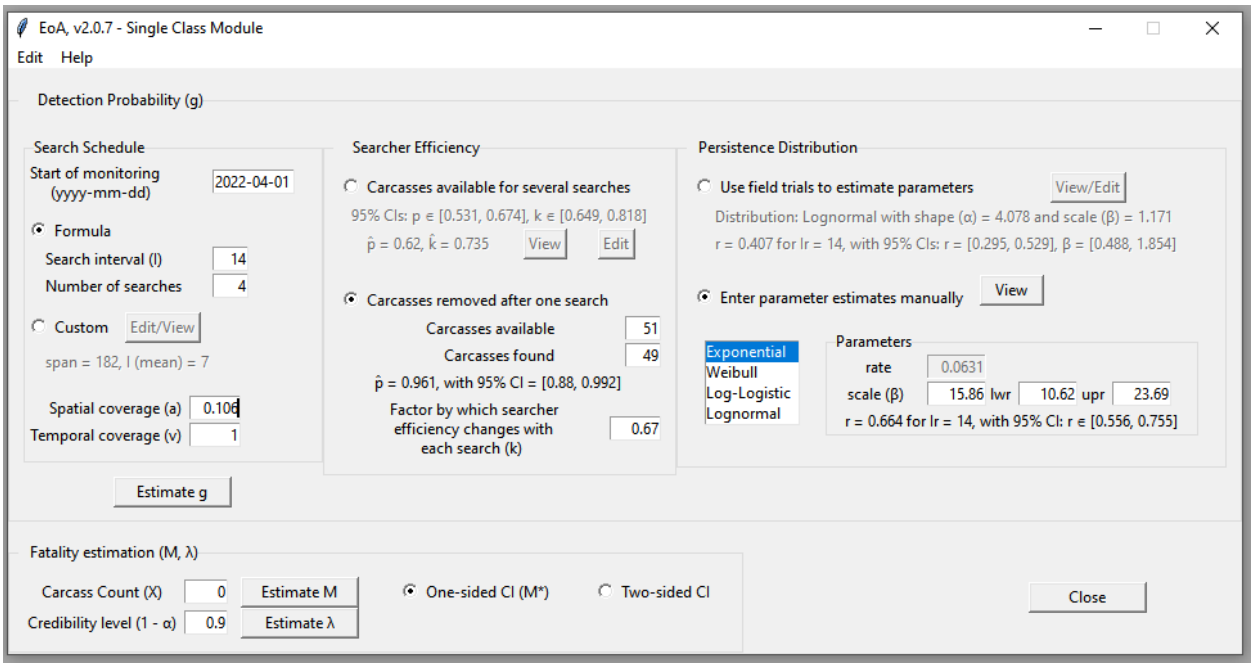


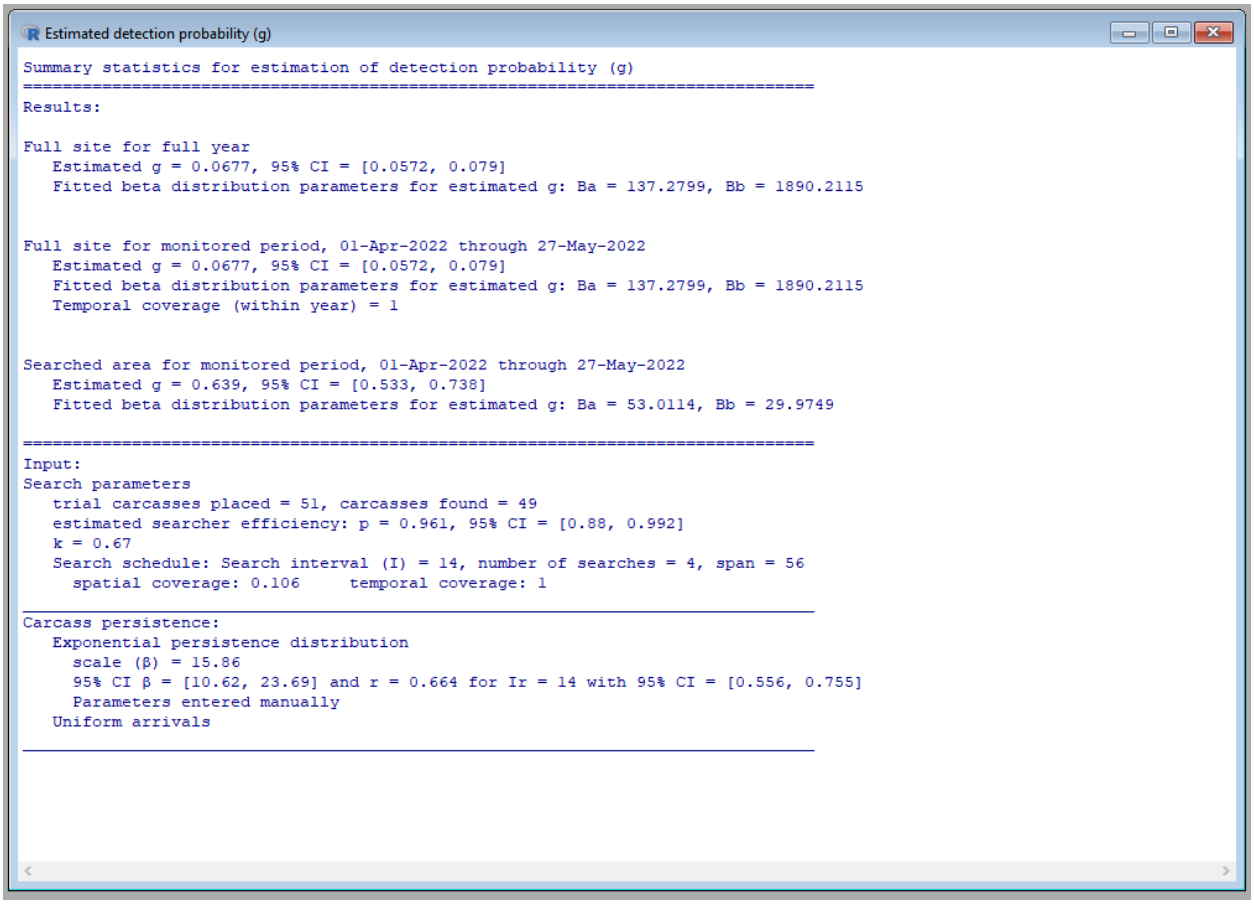
Appendix D6. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2022, 100-meter road and pad searches at 14 turbines with a blade length of 38.5 meters (1.5-megawatt turbines), searched at a 14-day interval.



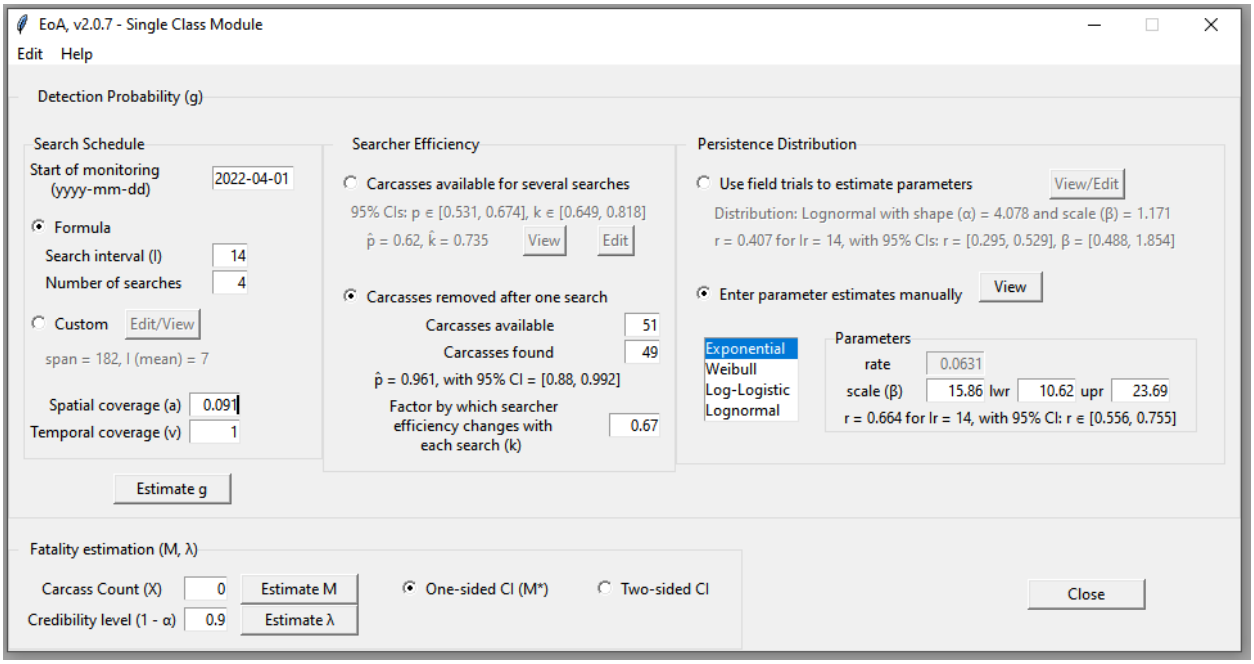


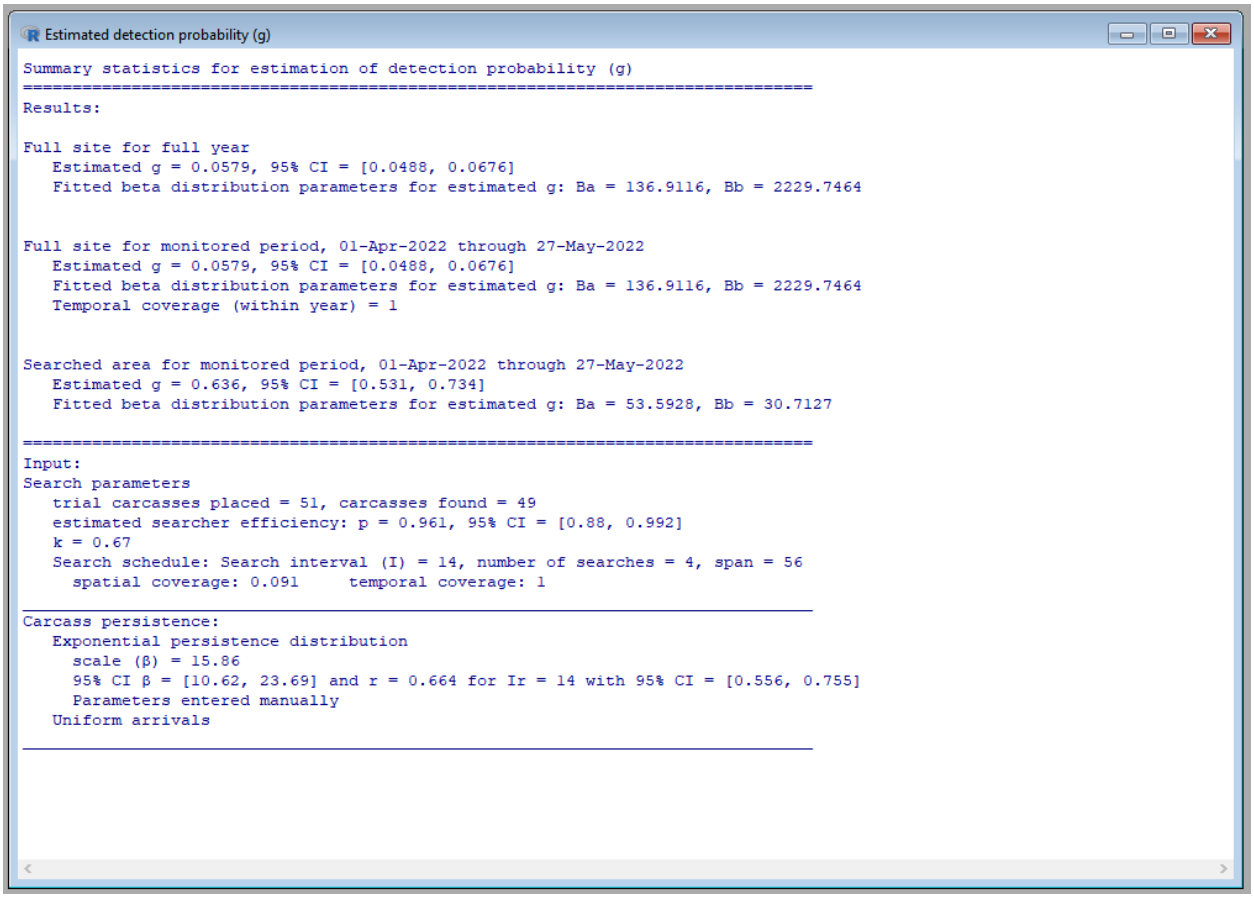
Appendix D7. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2022, 100-meter road and pad searches at 12 turbines with a blade length of 41 meters (1.5-megawatt turbines), searched at a 14-day interval.



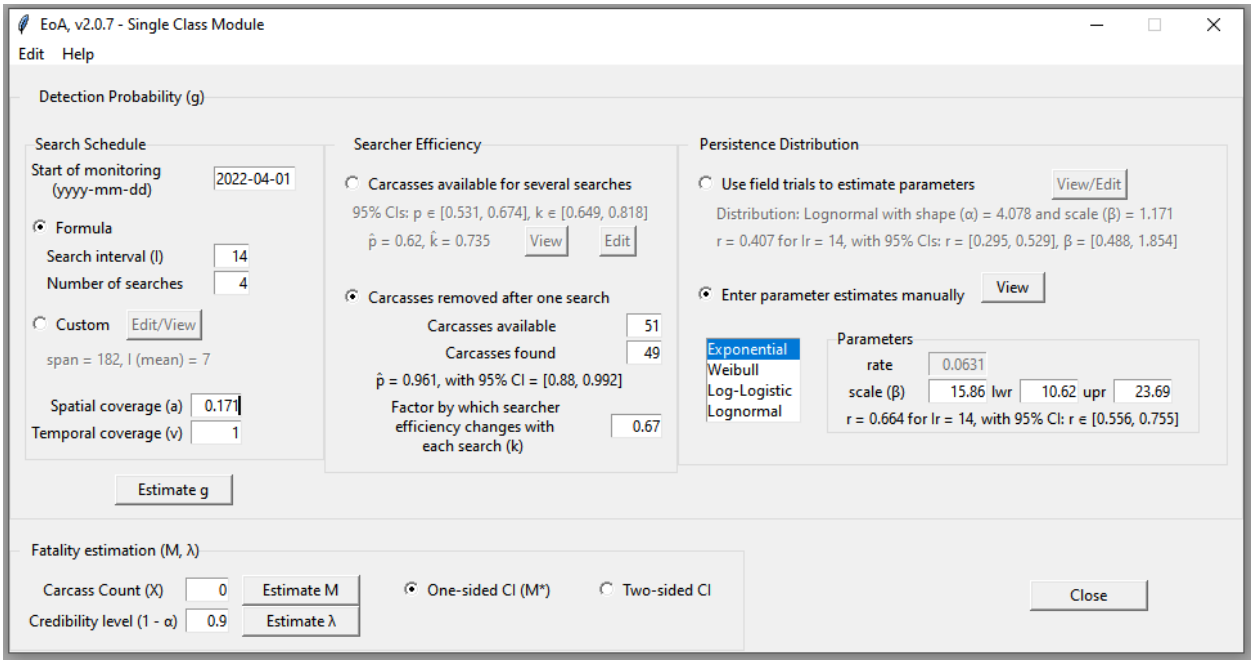


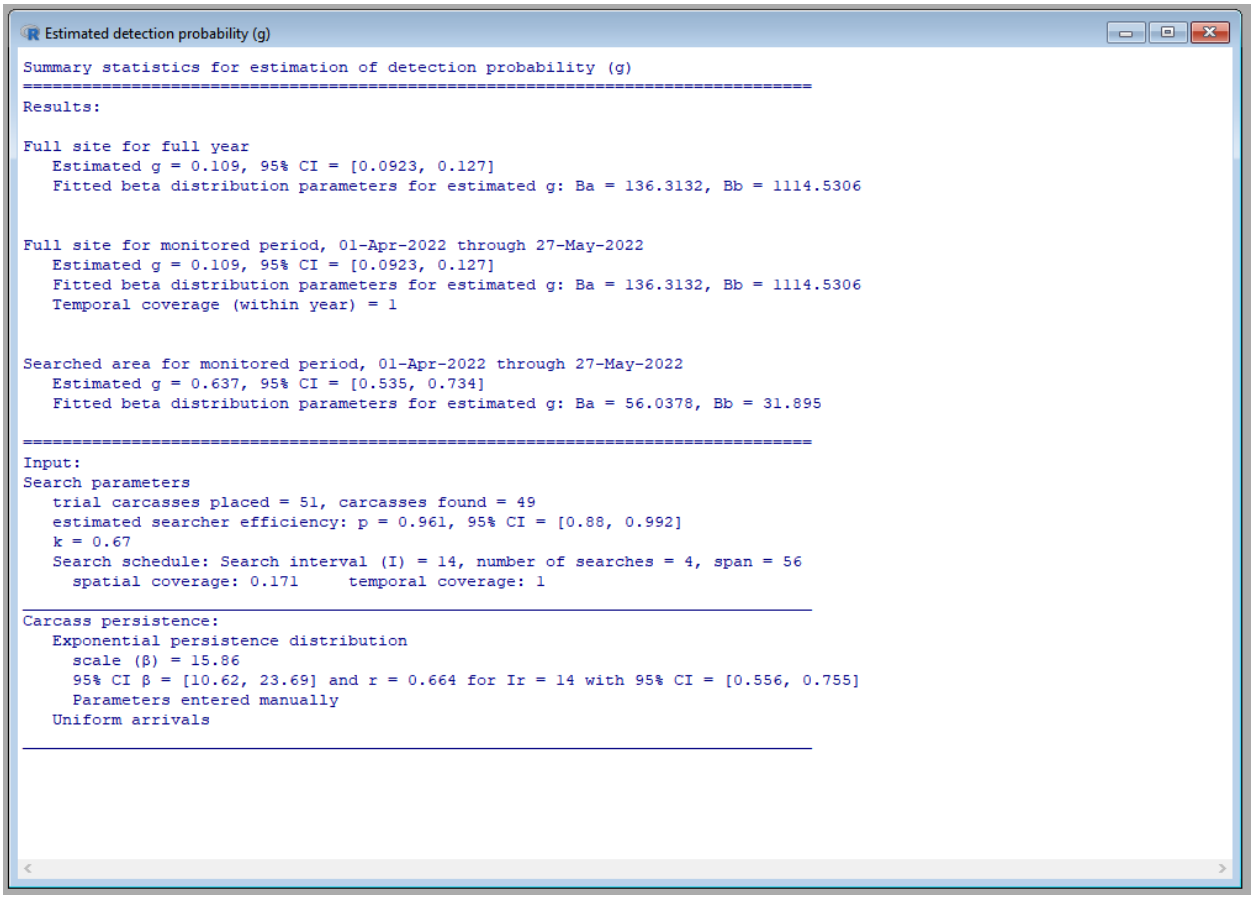
Appendix D8. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2022, 100-meter road and pad searches at 45 turbines with a blade length of 41 meters (1.65-megawatt turbines), searched at a 14-day interval.



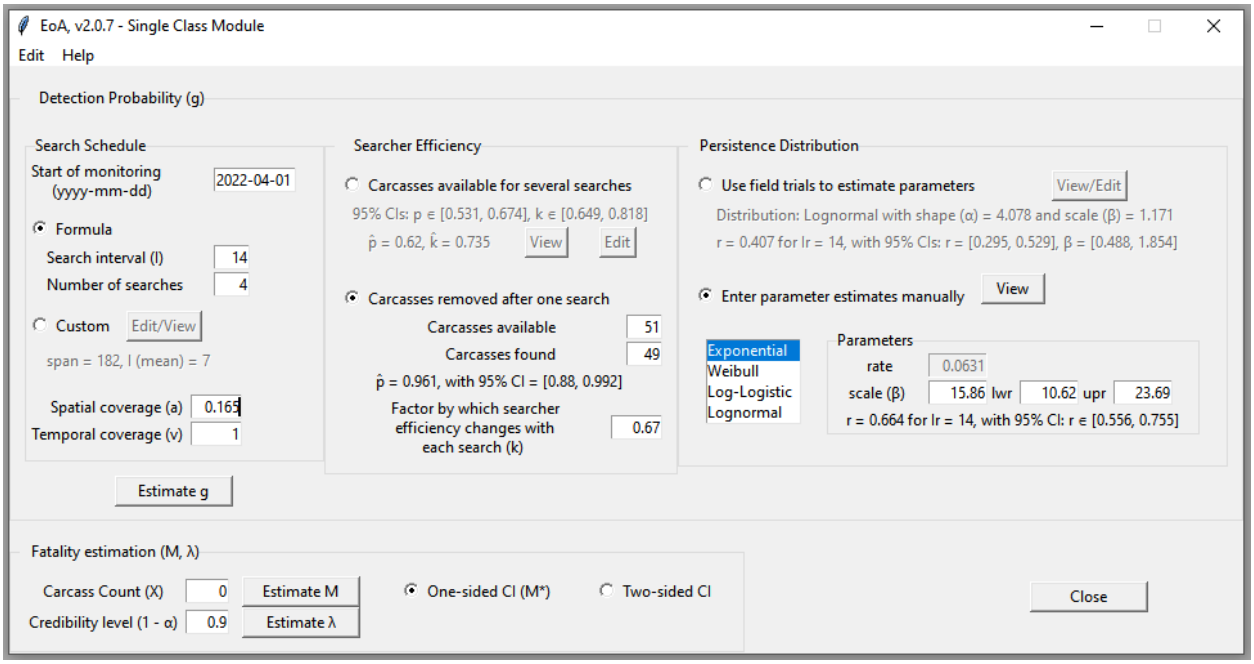


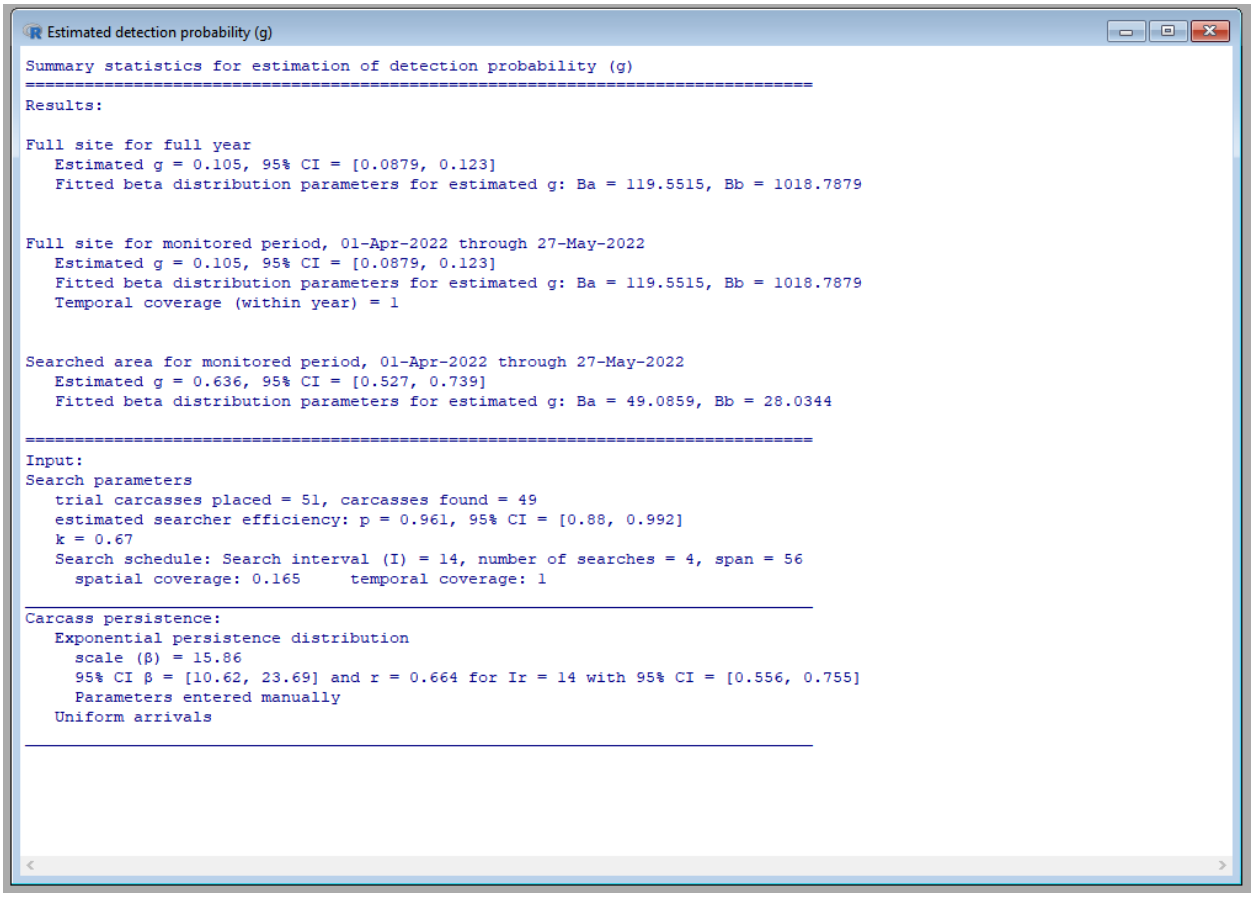
Appendix D9. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2022, 100-meter road and pad searches at 17 turbines with a blade length of 44 meters, searched at a 14-day interval.



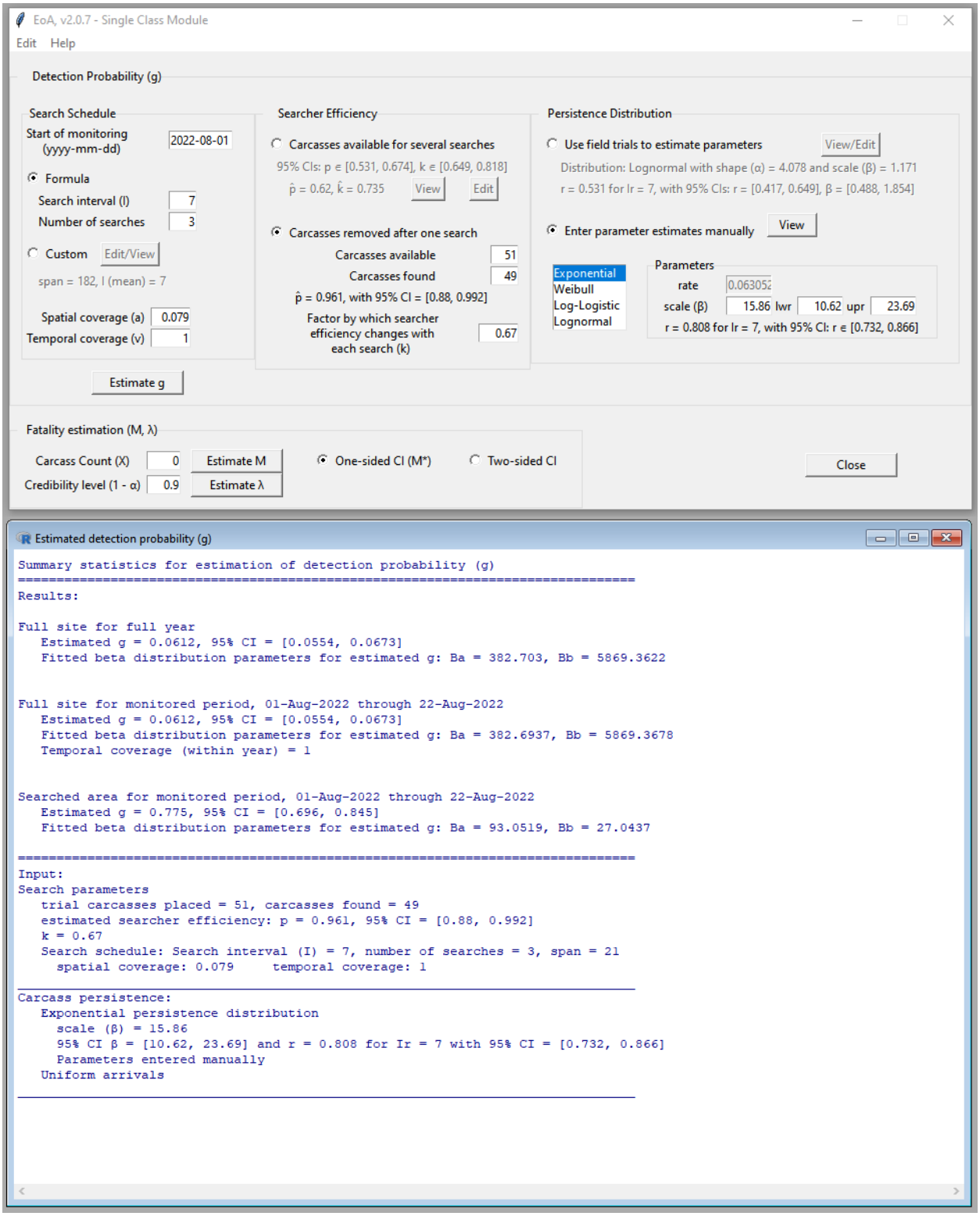


Appendix D10. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2022, 100-meter road and pad searches at nine turbines with a blade length of 55 meters, searched at a 14-day interval.

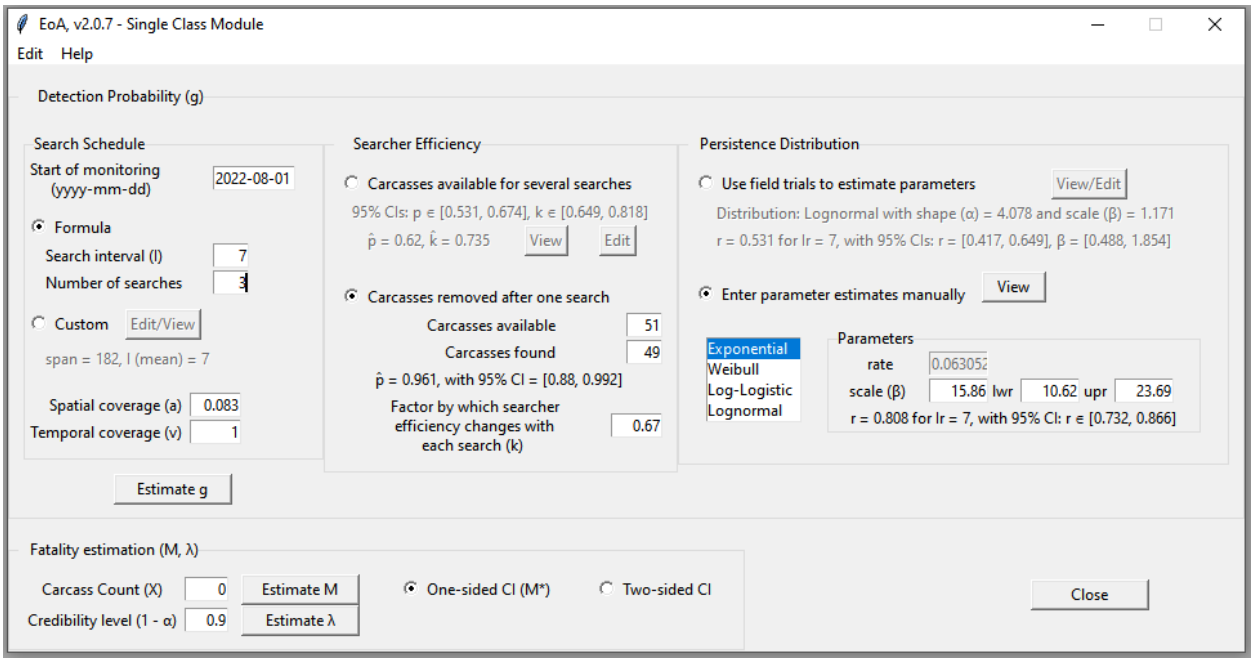


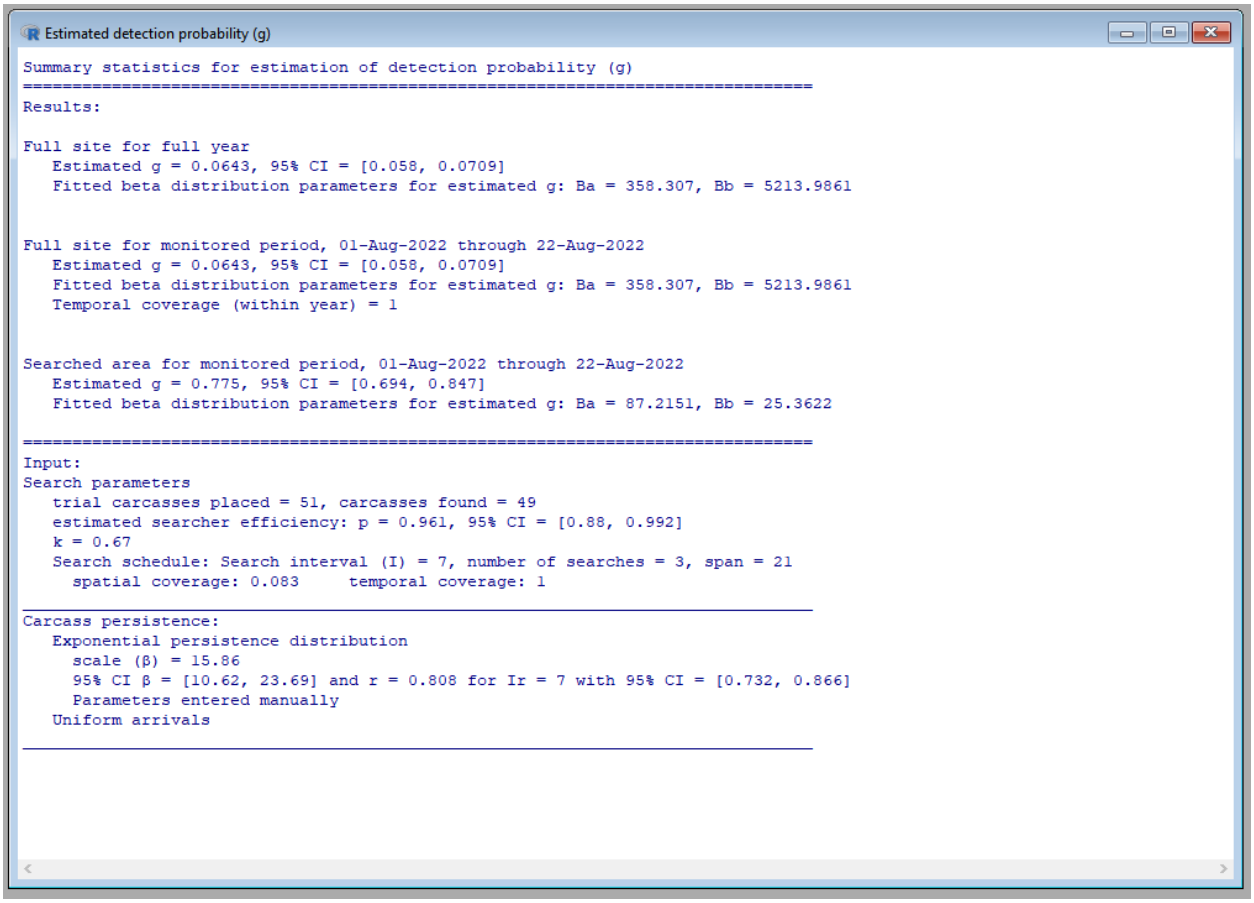


Appendix D11. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2022, 100-meter road and pad searches at 14 turbines with a blade length of 68 meters, searched at a 14-day interval.

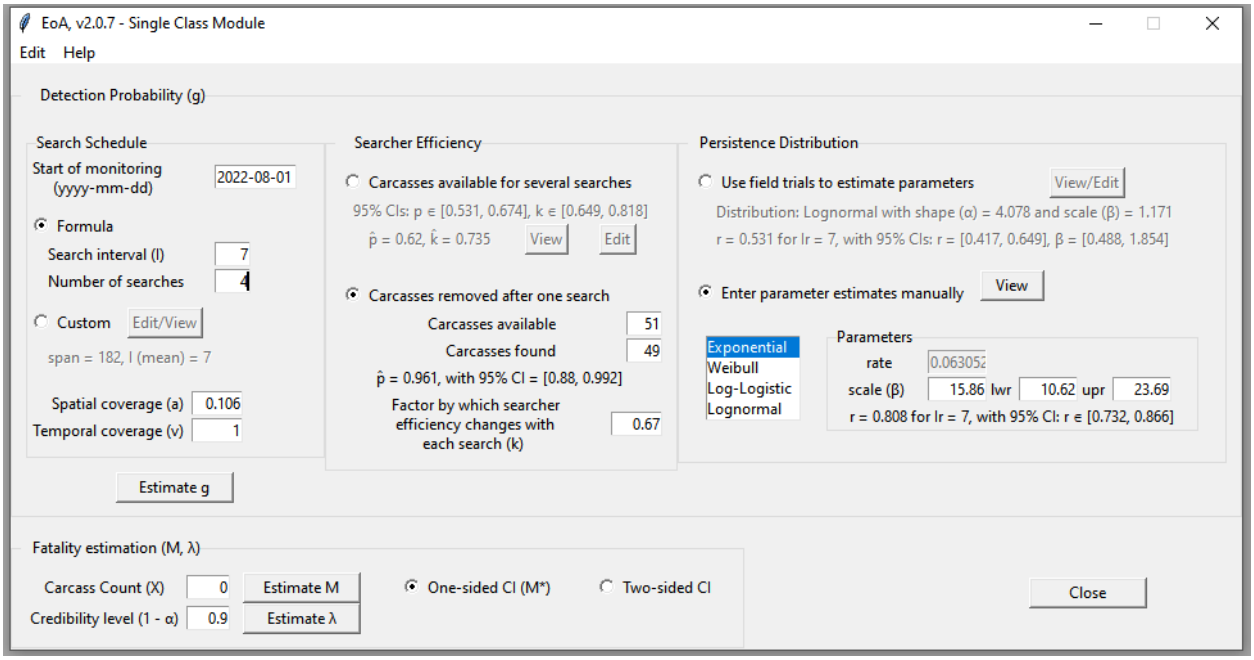


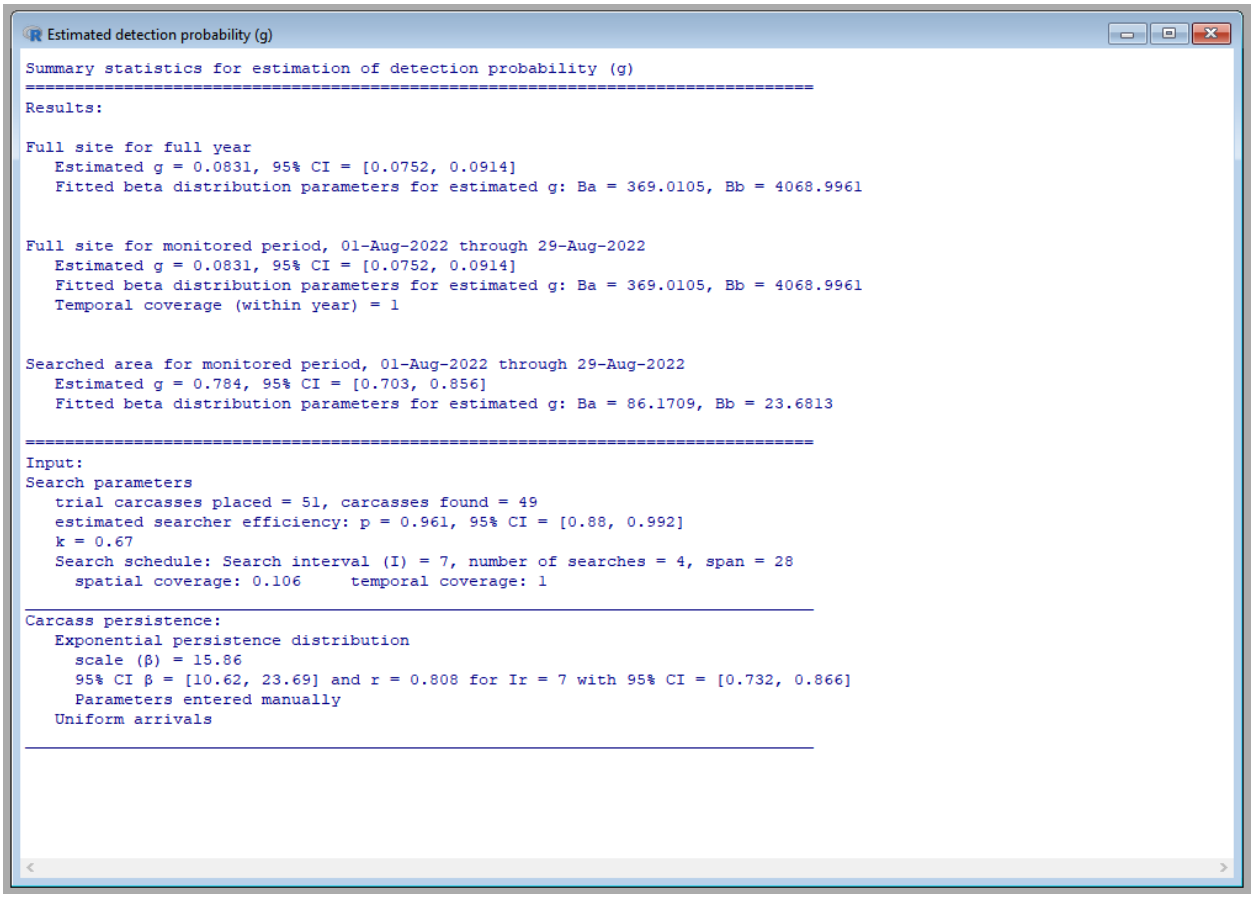
Appendix D12. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 100-meter road and pad searches at 14 turbines with a blade length of 38.5 meters, searched at a 7-day interval.



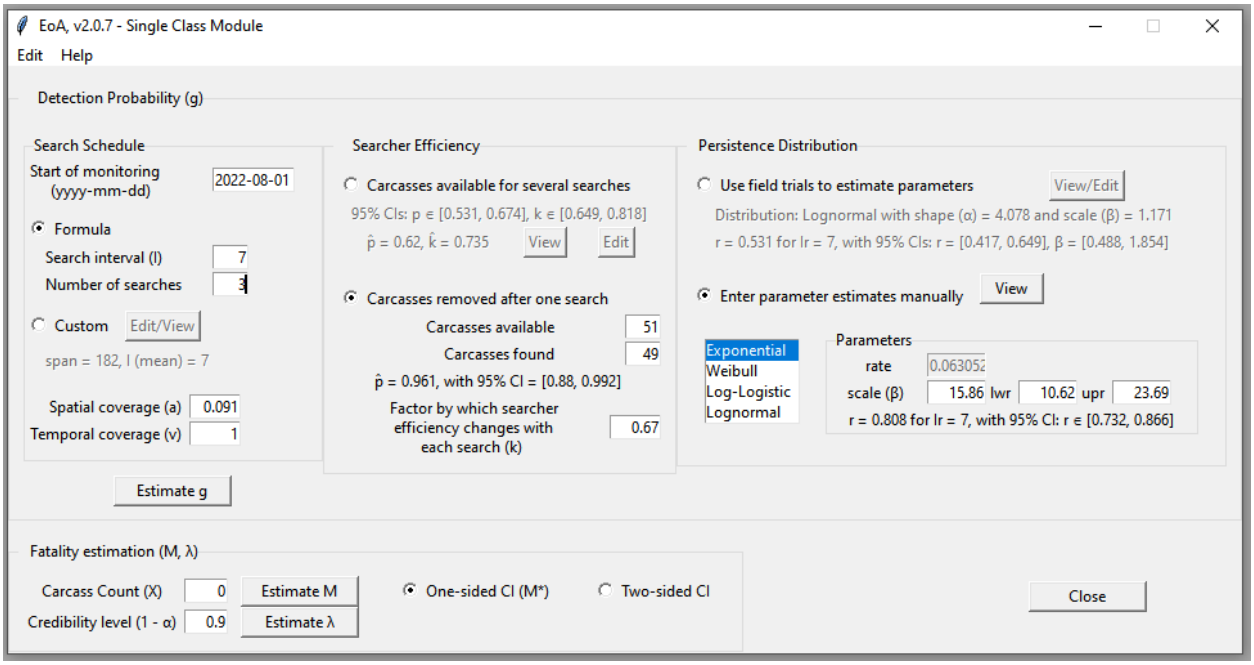


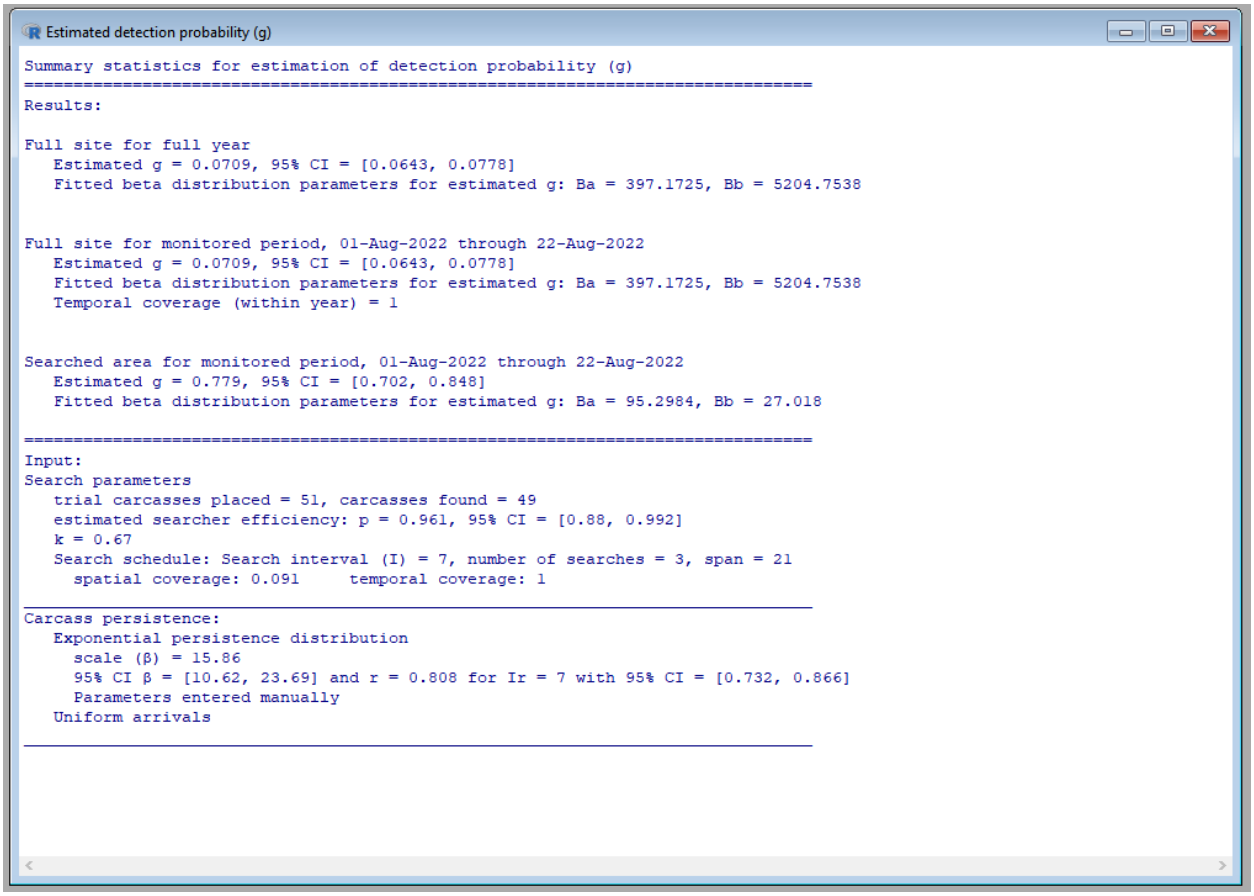
Appendix D13. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 100-meter road and pad searches at 13 turbines with a blade length of 41 meters (1.5-megawatt turbines), searched at a 7-day interval.



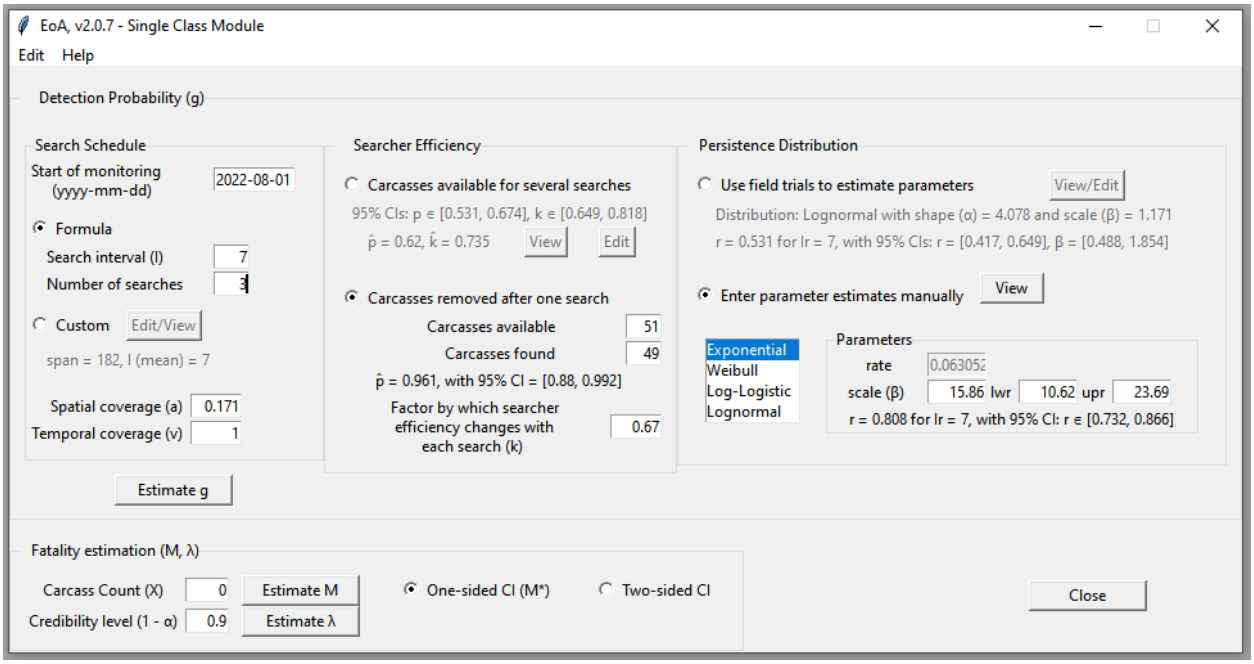


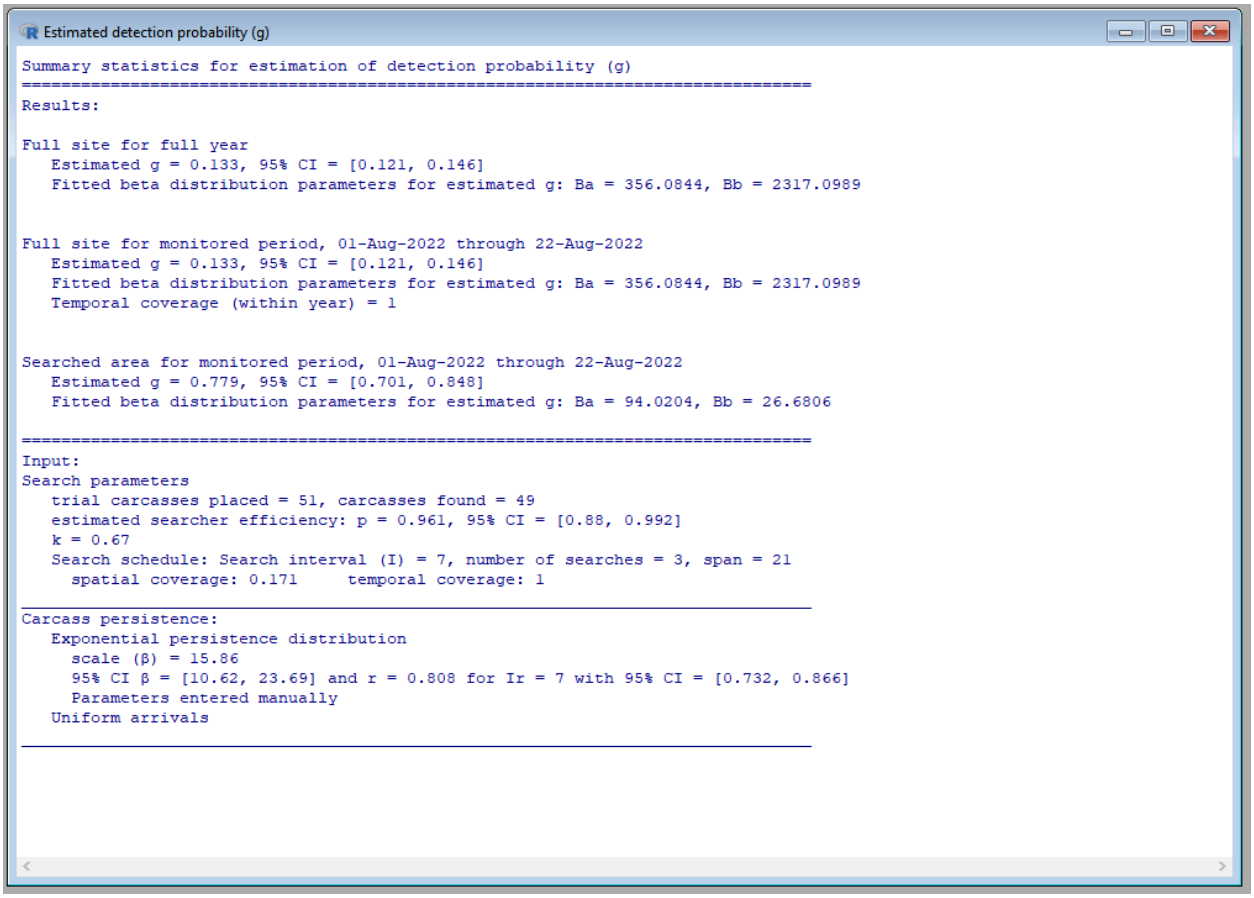
Appendix D14. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 100-meter road and pad searches at 21 turbines with a blade length of 41 meters (1.65-megawatt turbines), searched at a 7-day interval.



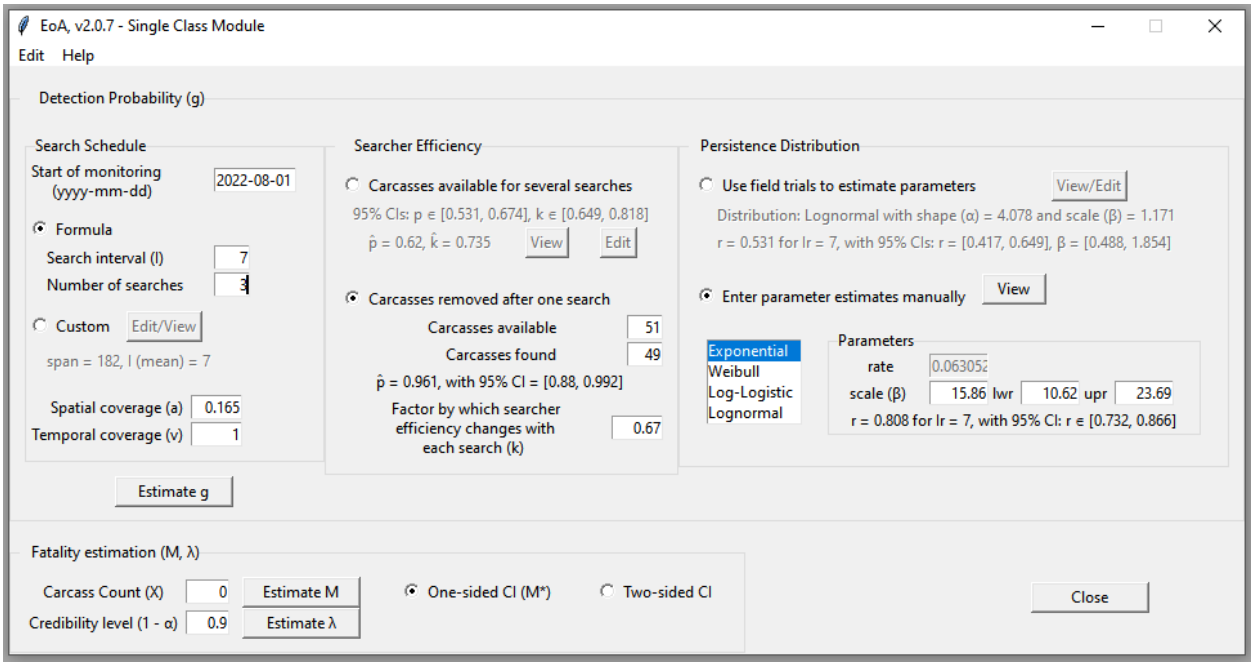


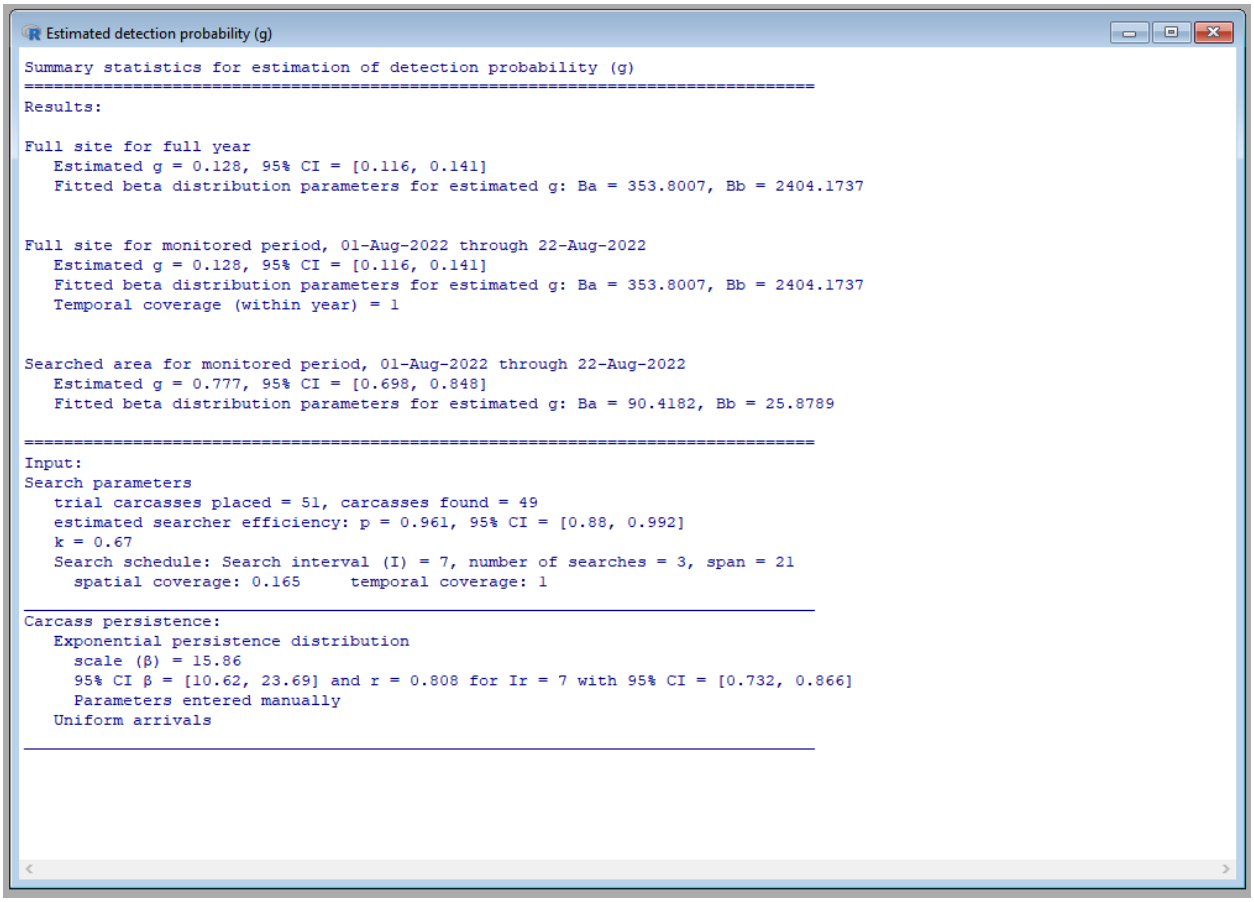
Appendix D15. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 100-meter road and pad searches at eight turbines with a blade length of 44 meters, searched at a 7-day interval.



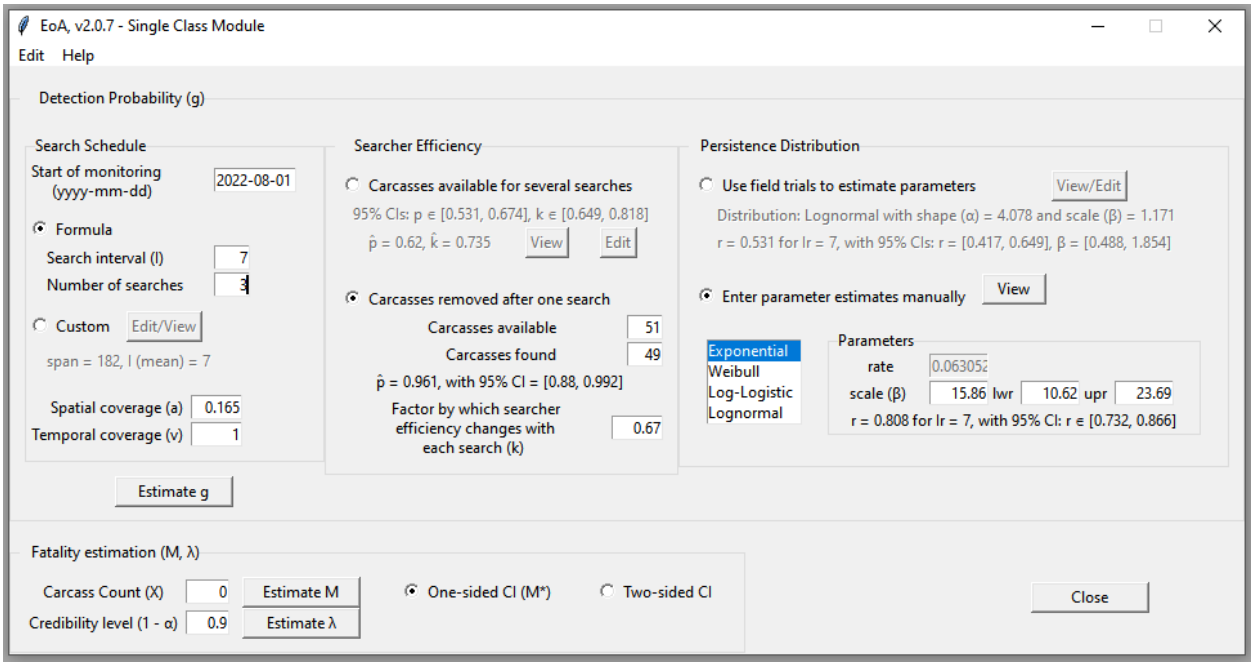


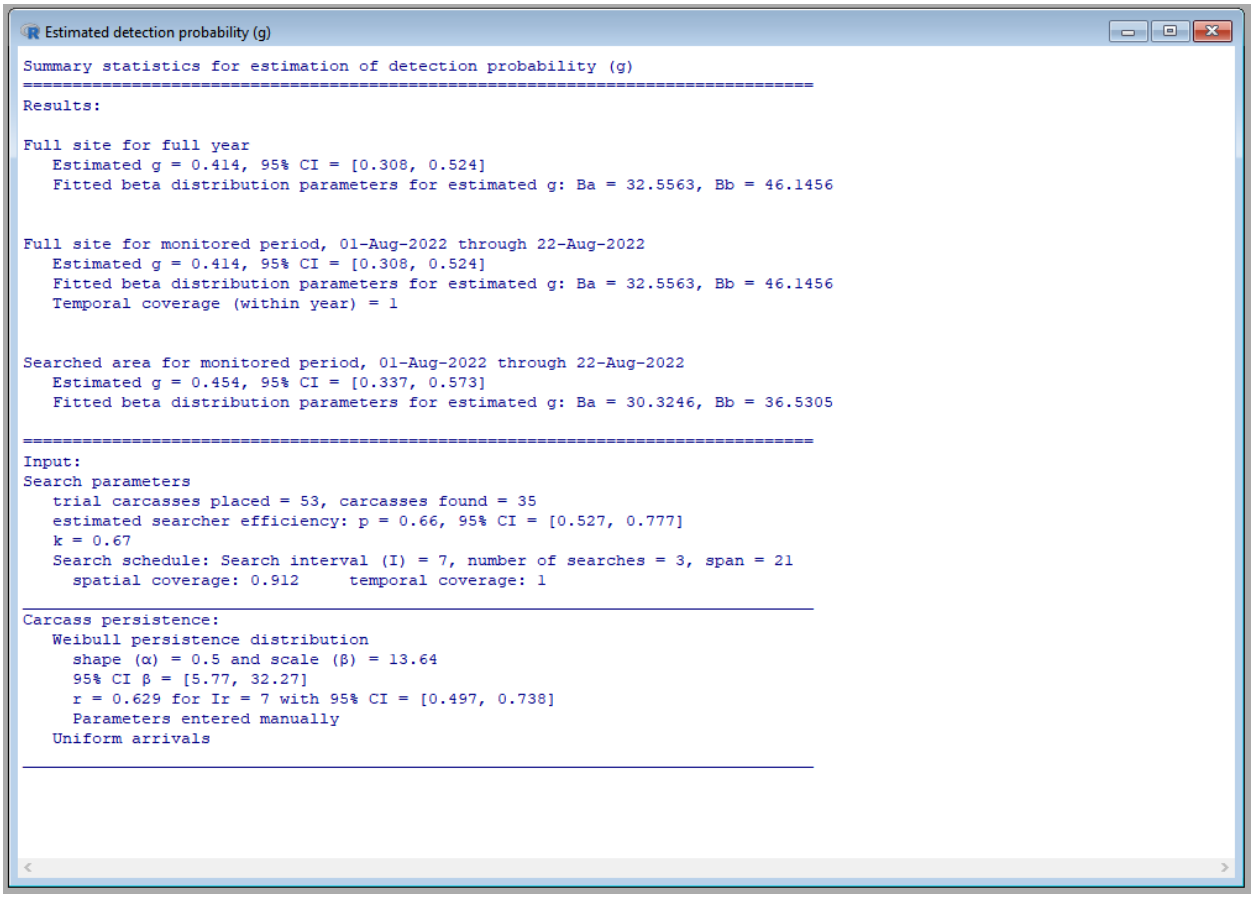
Appendix D16. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 100-meter road and pad searches at eight turbines with a blade length of 55 meters, searched at a 7-day interval.



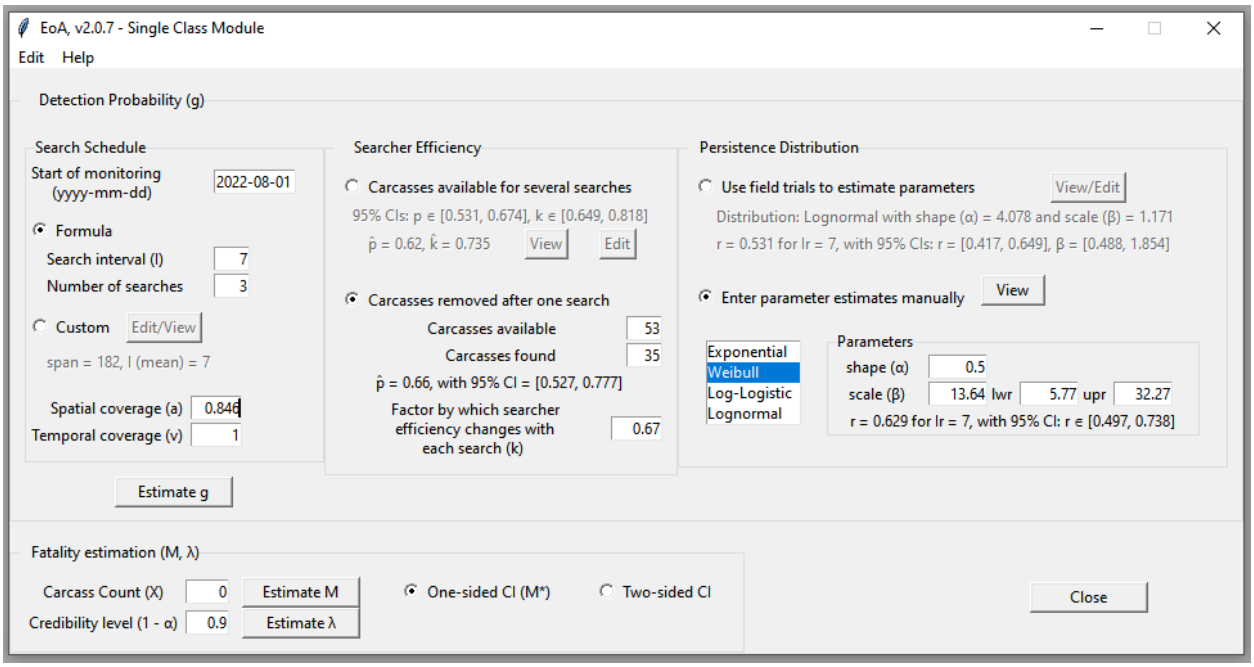


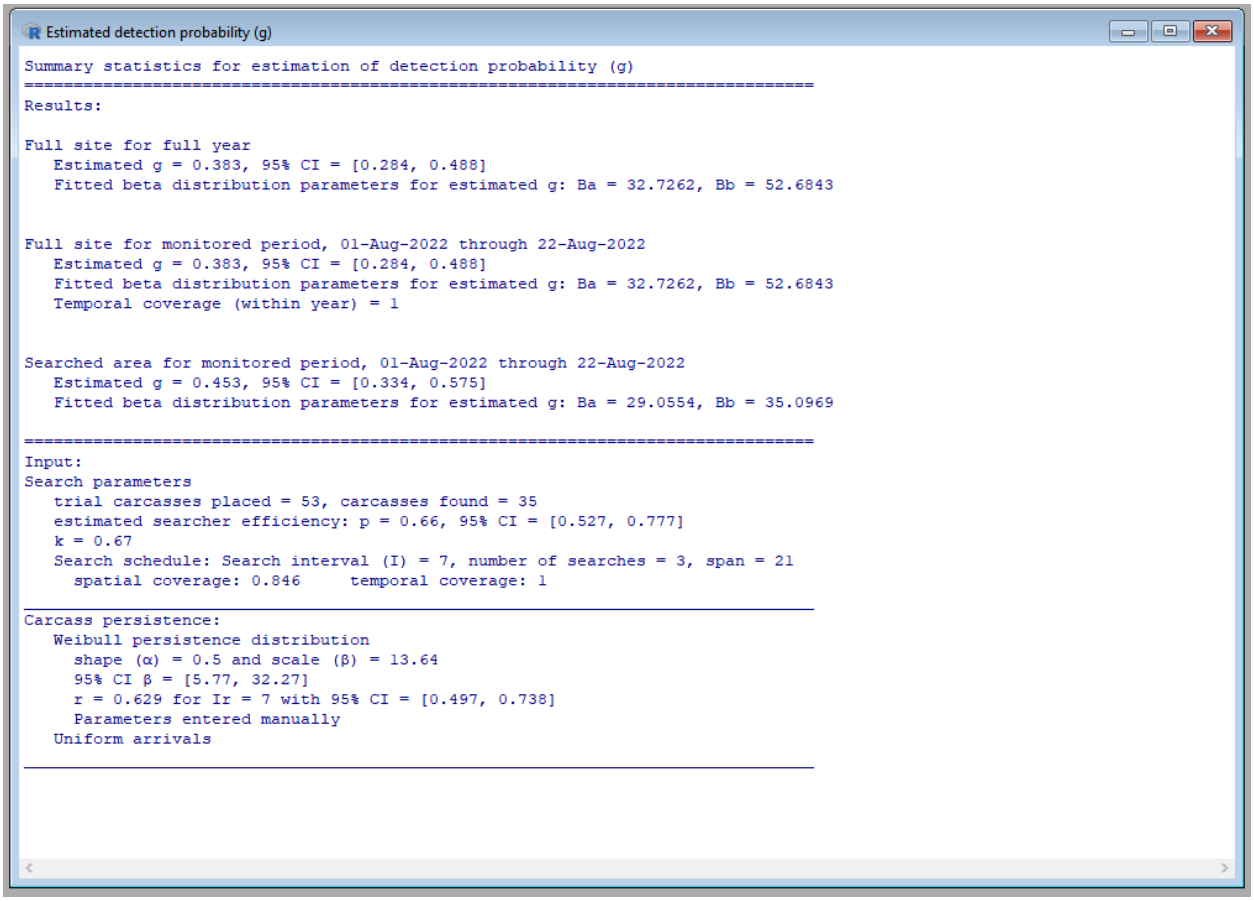
Appendix D17. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 100-meter road and pad searches at nine turbines with a blade length of 68 meters, searched at a 7-day interval.



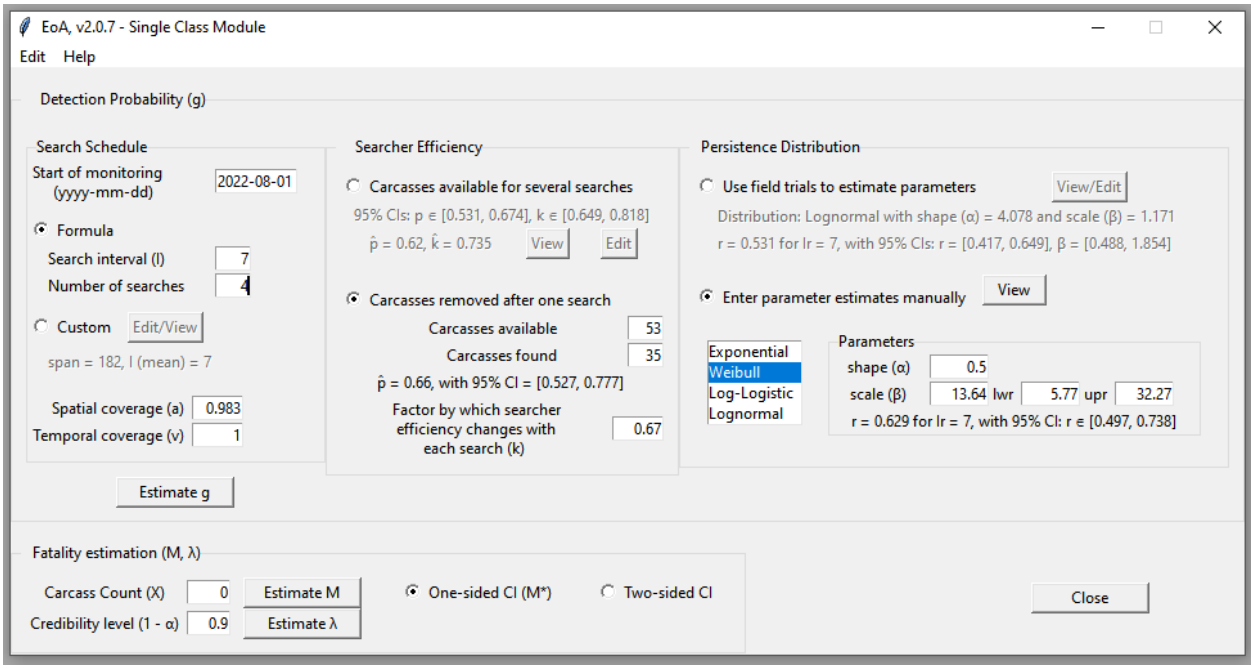


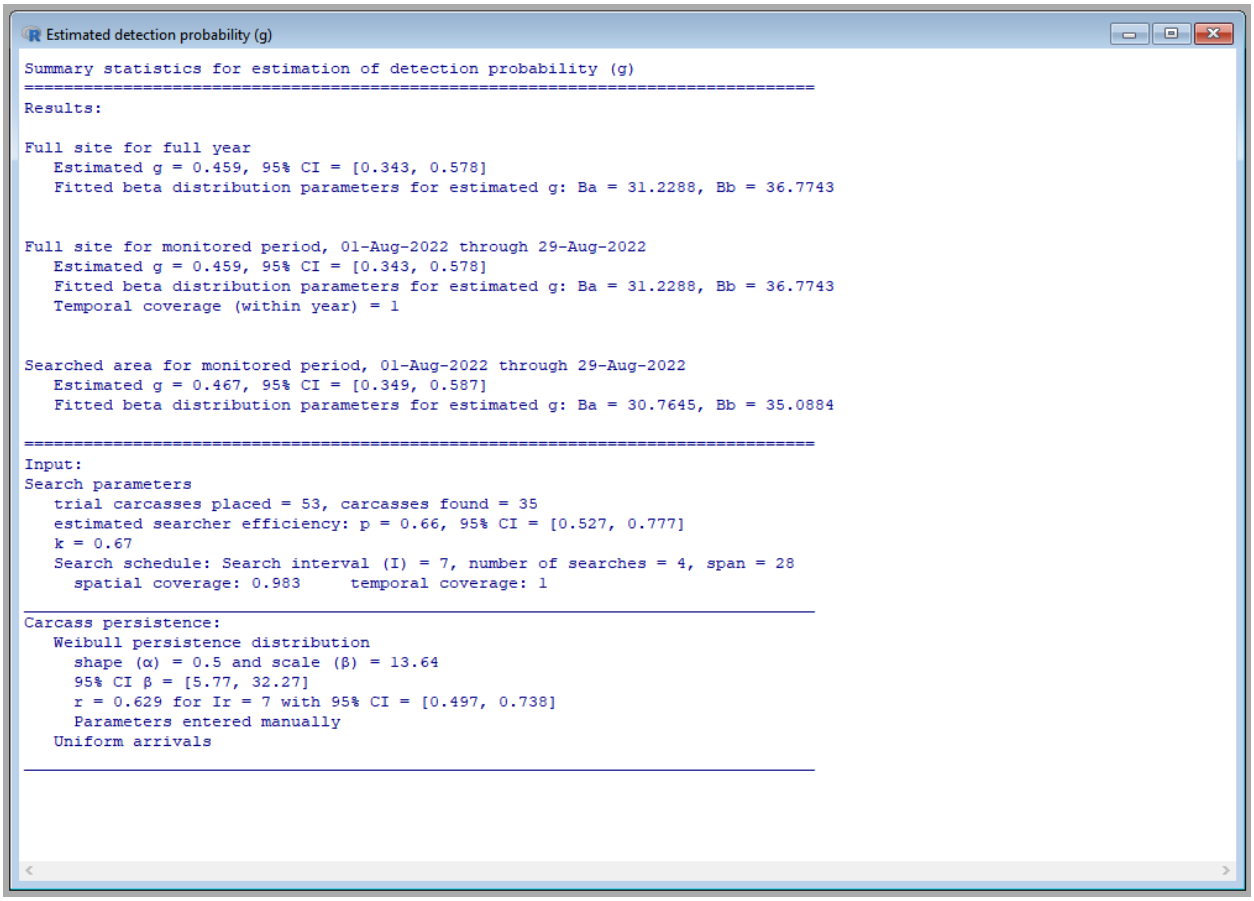
Appendix D18. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 70-meter full plot searches at four turbines with a blade length of 38.5 meters, searched at a 7-day interval.



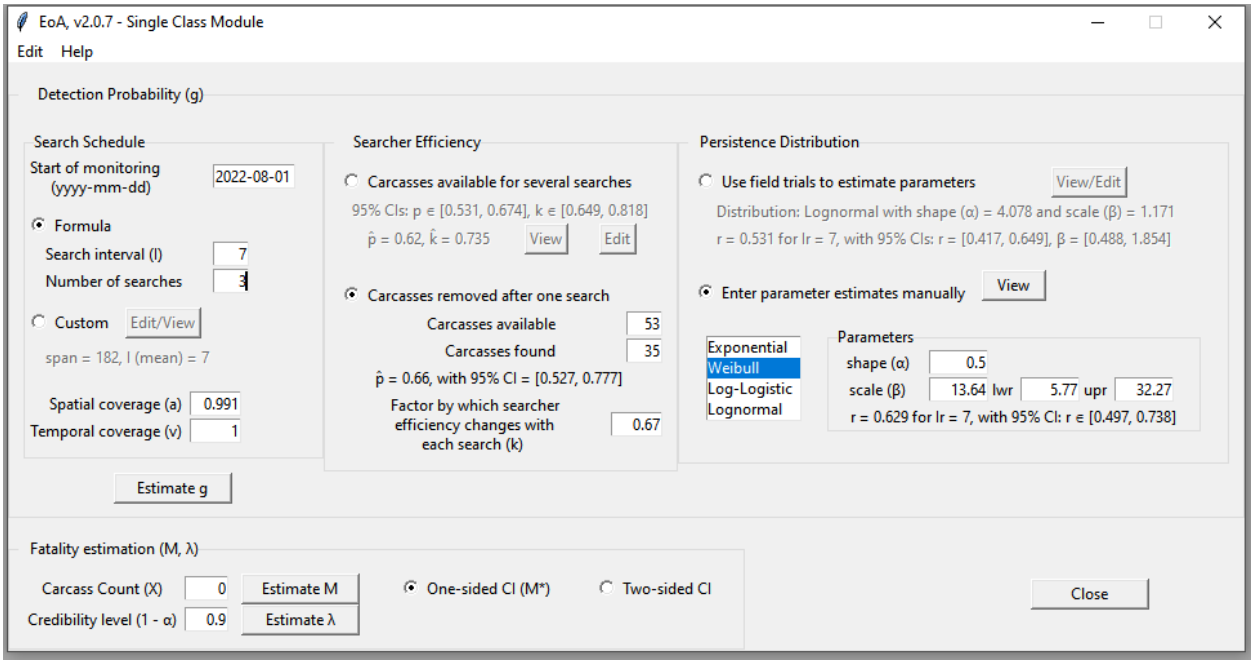


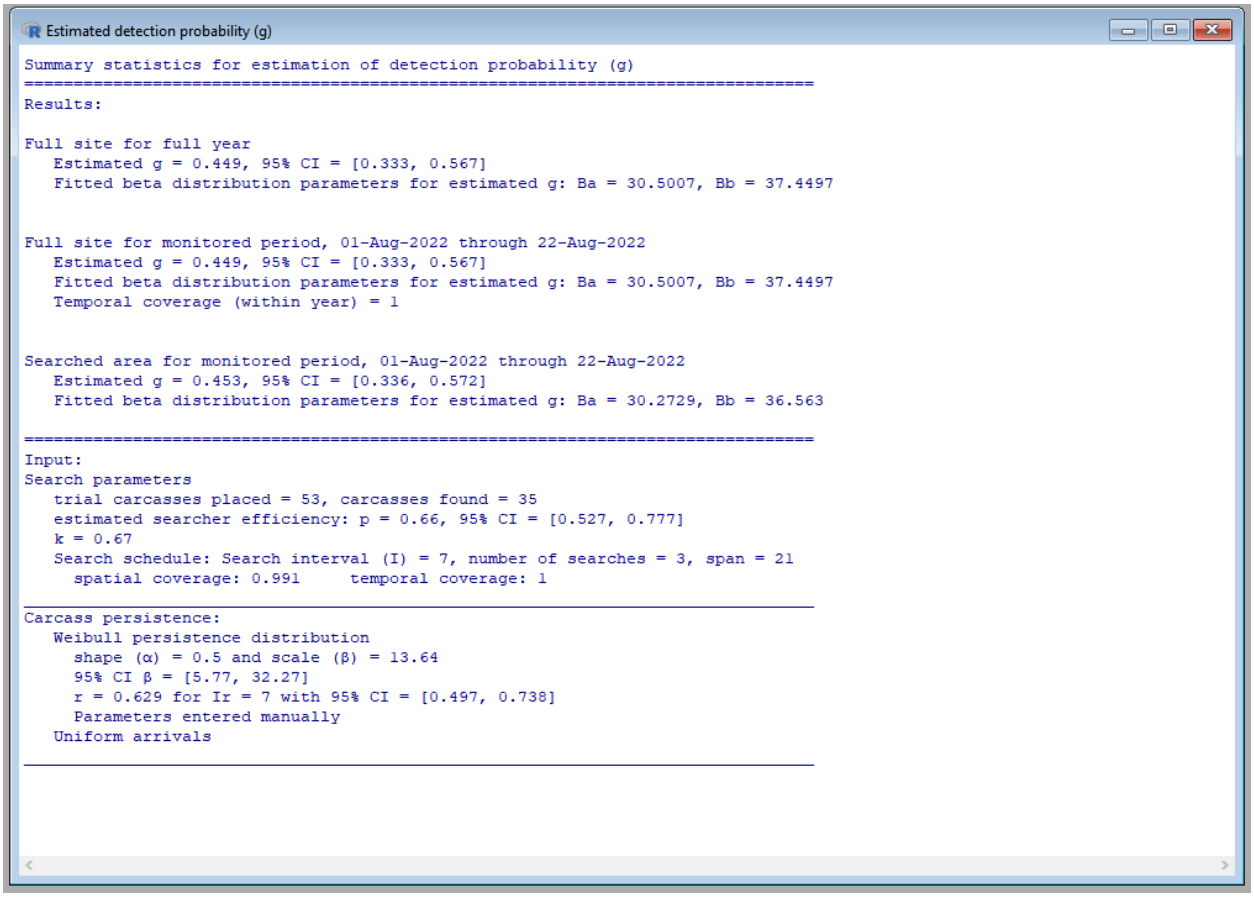
Appendix D19. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 70-meter full plot searches at five turbines with a blade length of 41 meters (1.5-megawatt turbines), searched at a 7-day interval.



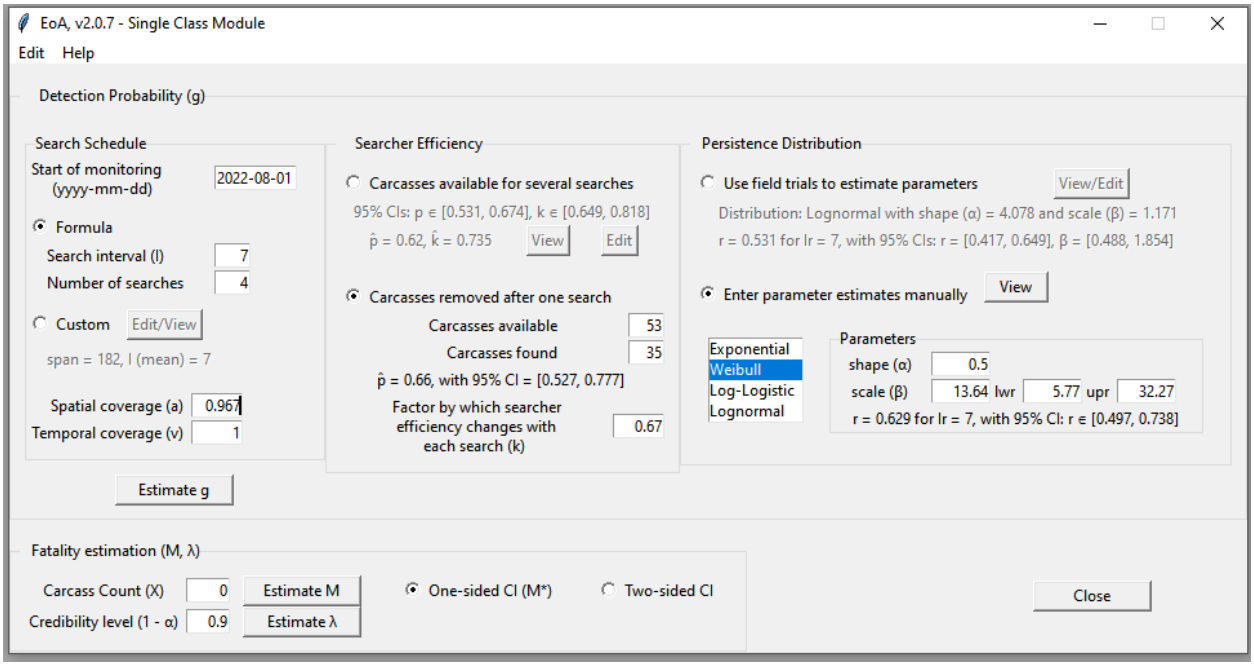


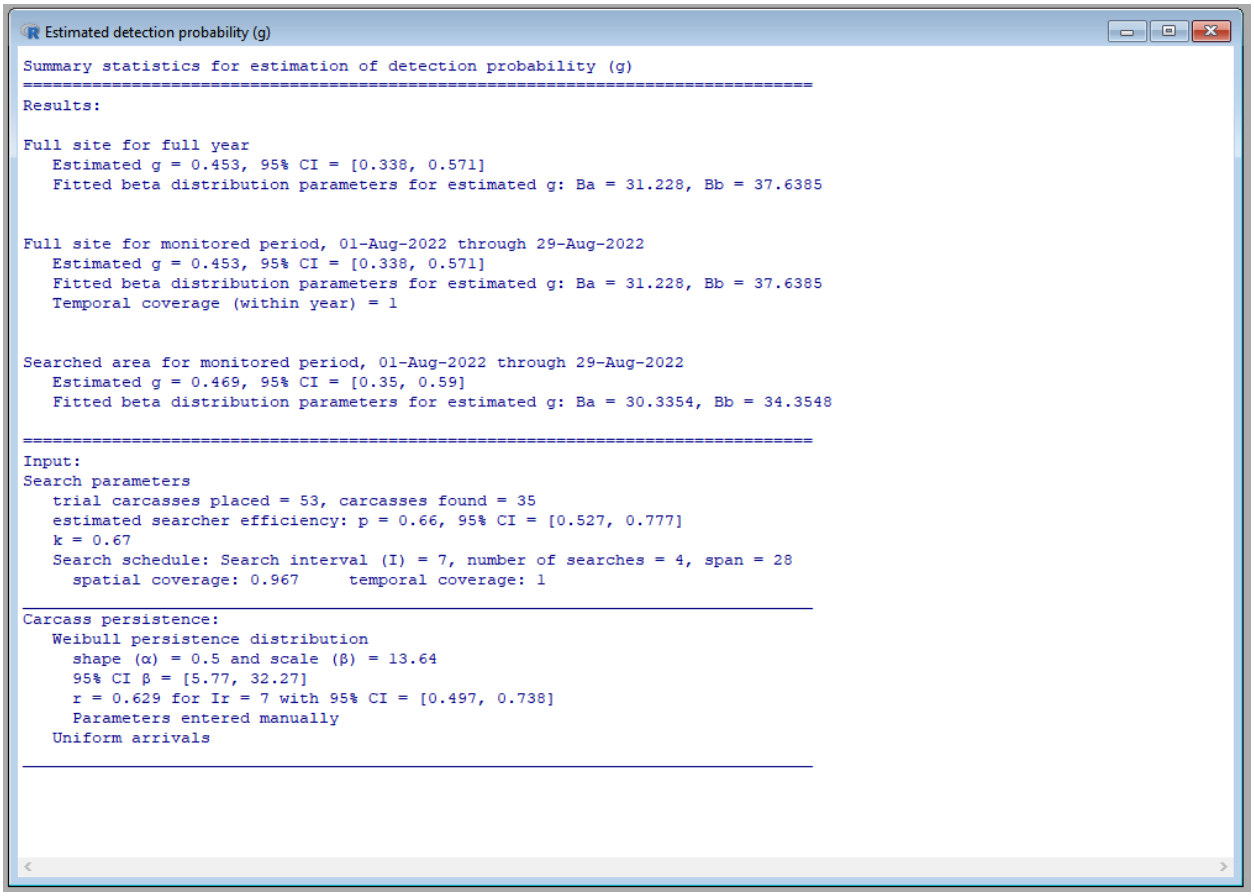
Appendix D20. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 70-meter full plot searches at nine turbines with a blade length of 41 meters (1.65-megawatt turbines), searched at a 7-day interval.



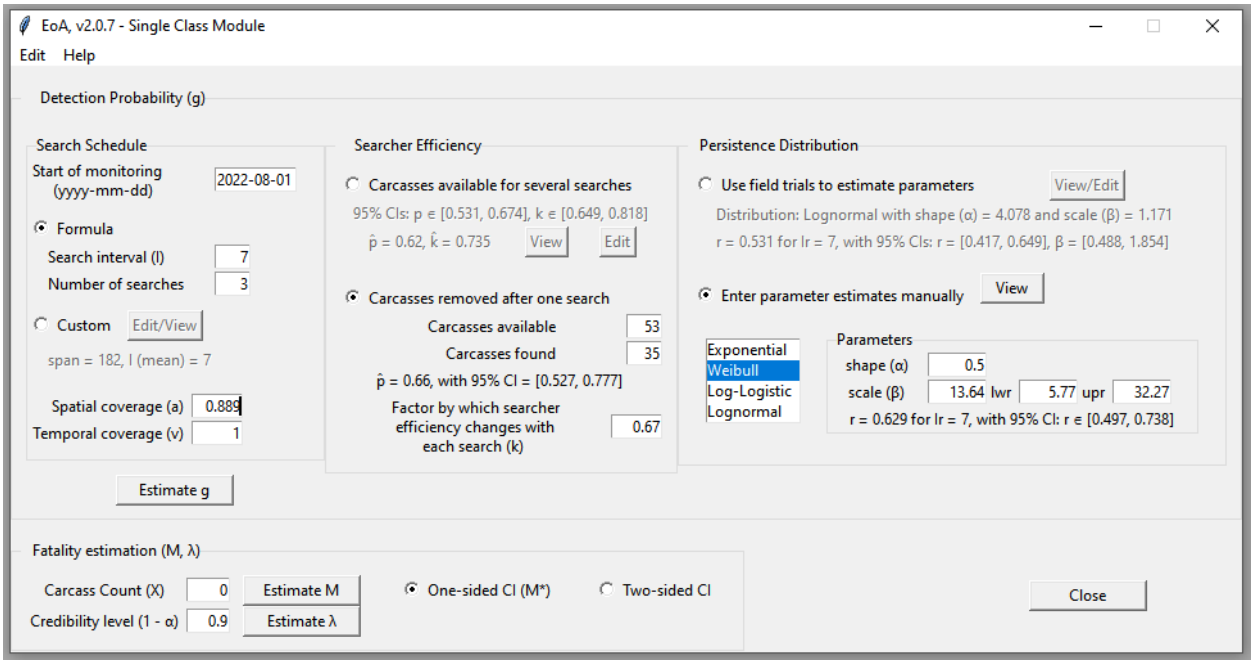


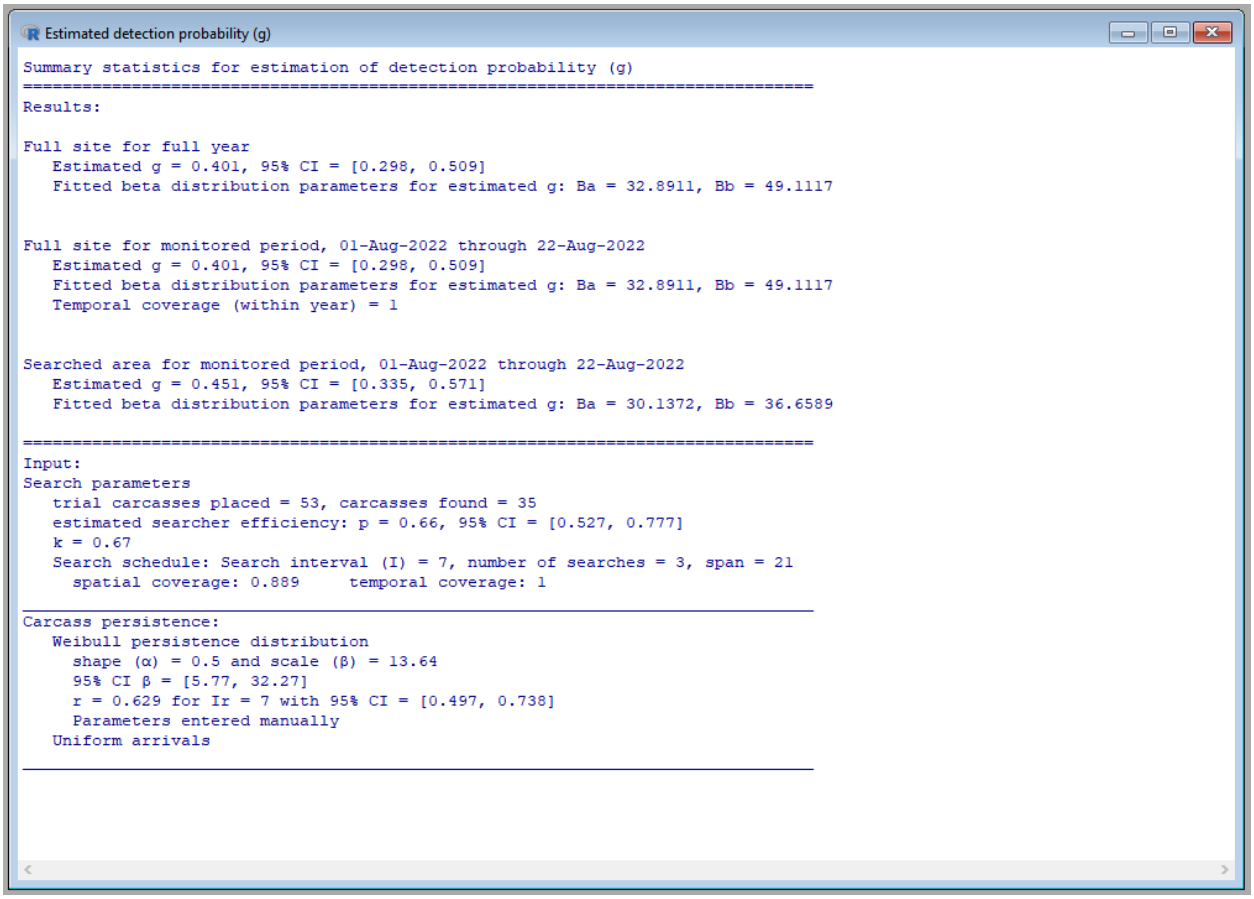
Appendix D21. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 70-meter full plot searches at four turbines with a blade length of 44 meters, searched at a 7-day interval.



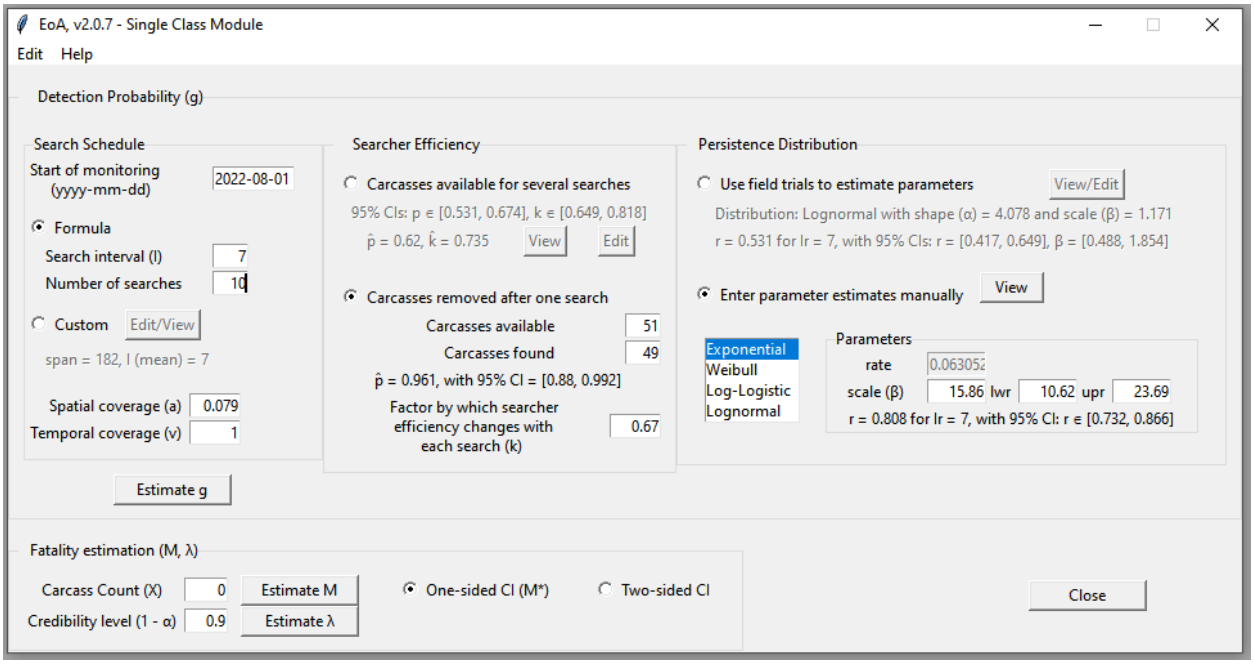


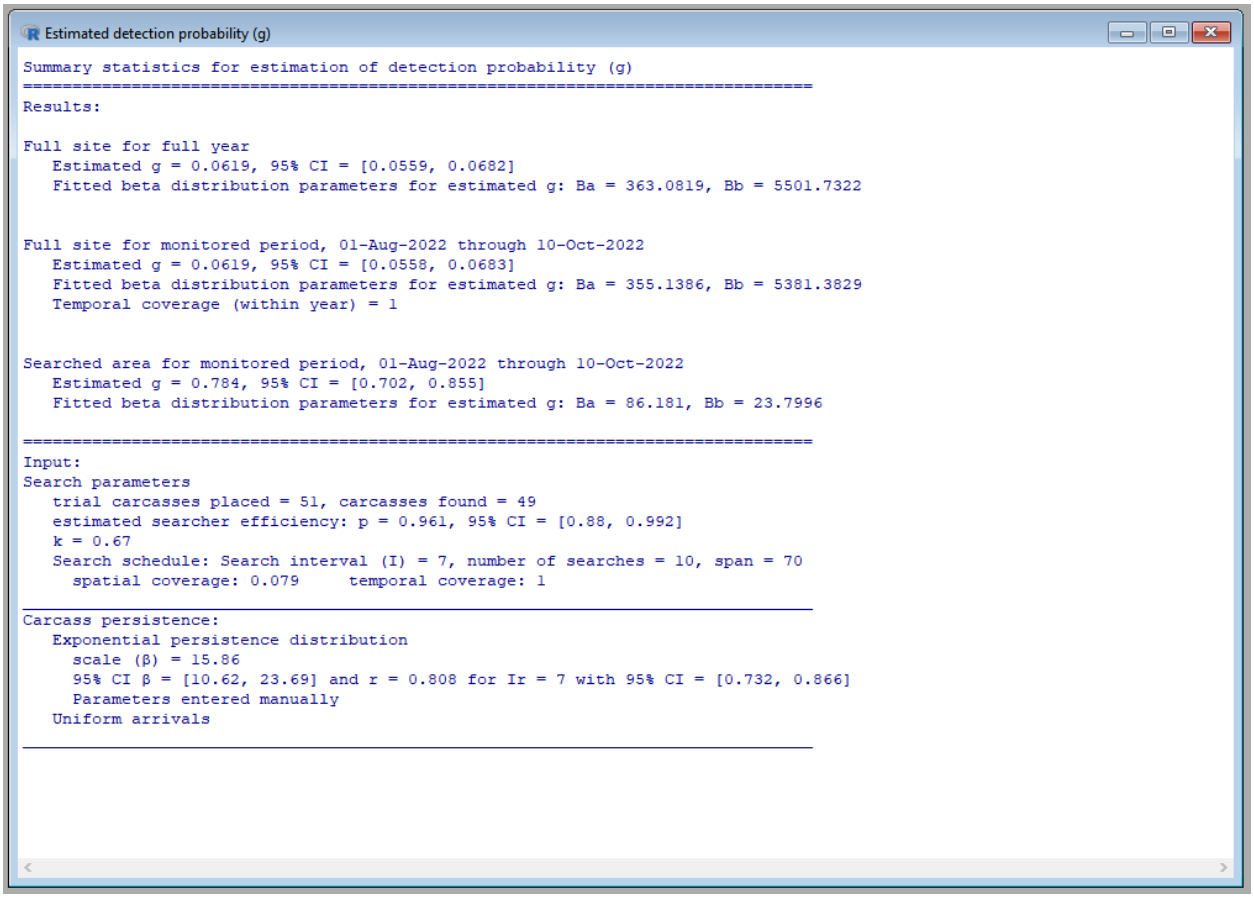
Appendix D22. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 70-meter full plot searches at five turbines with a blade length of 55 meters, searched at a 7-day interval.



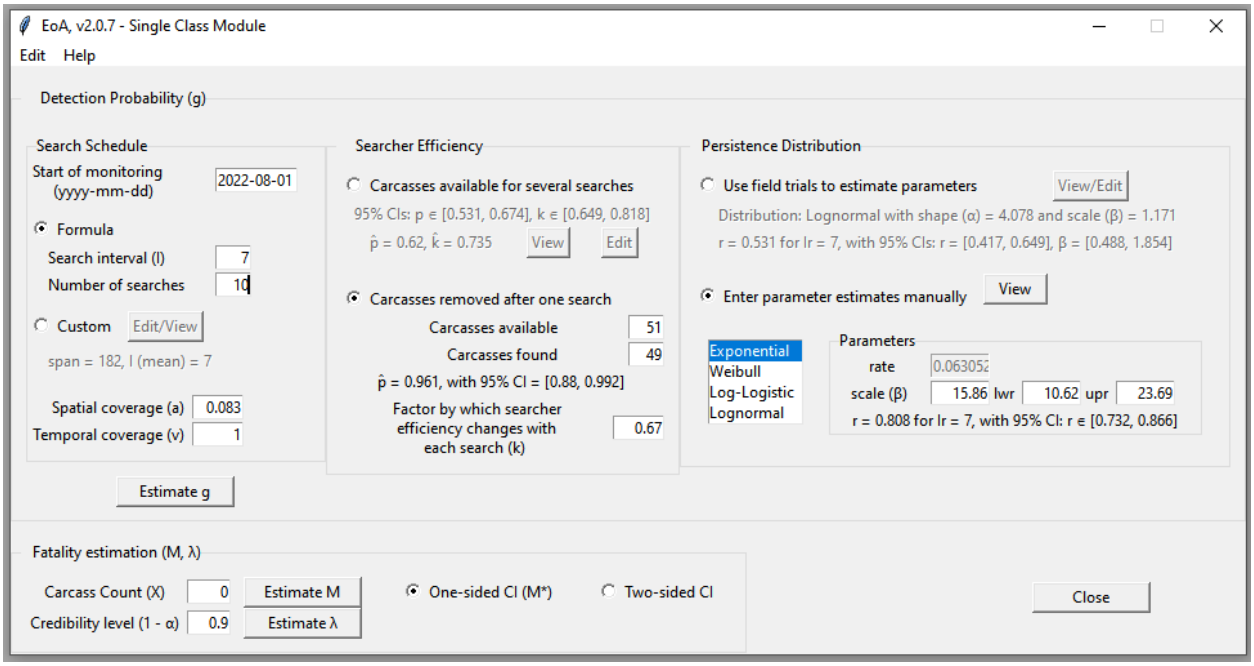


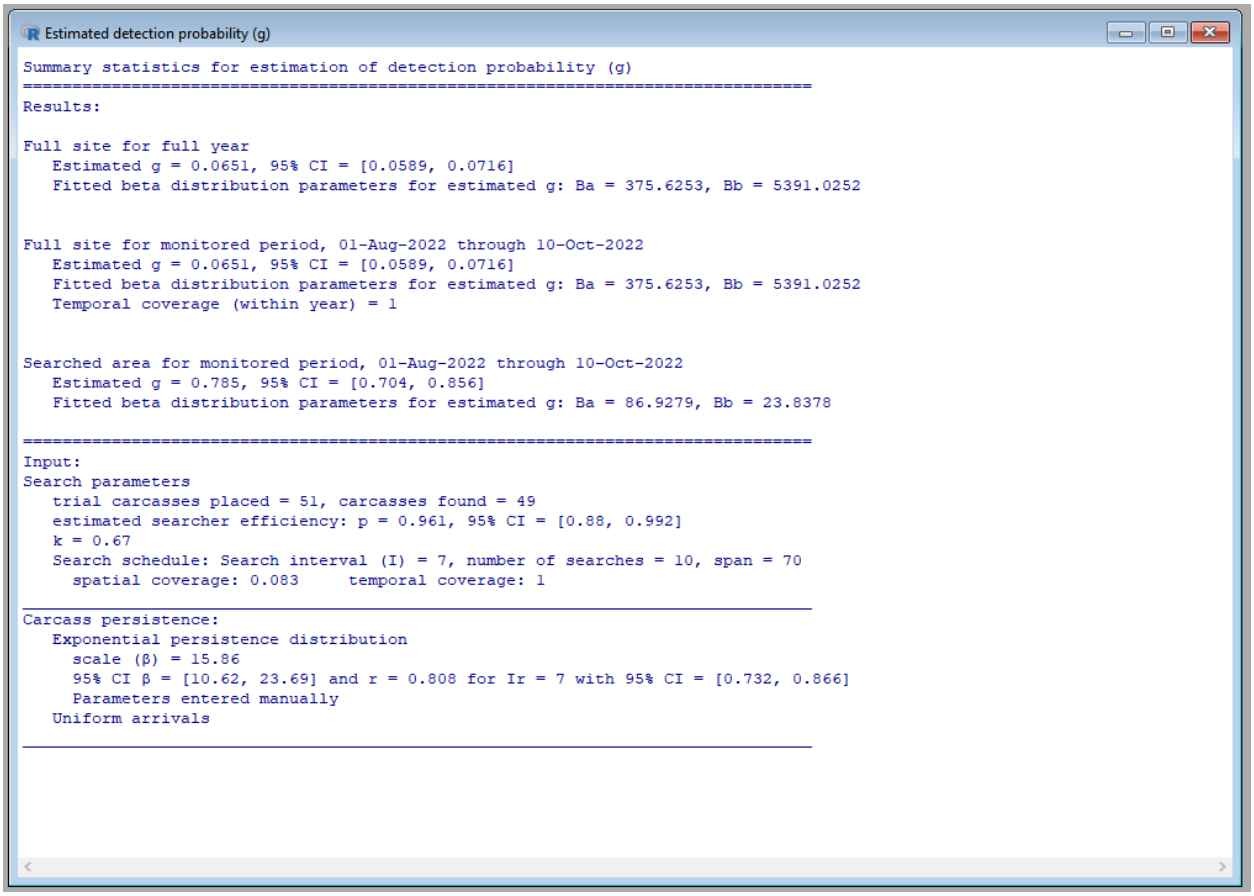
Appendix D23. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 1 2022, 70-meter full plot searches at five turbines with a blade length of 68 meters, searched at a 7-day interval.



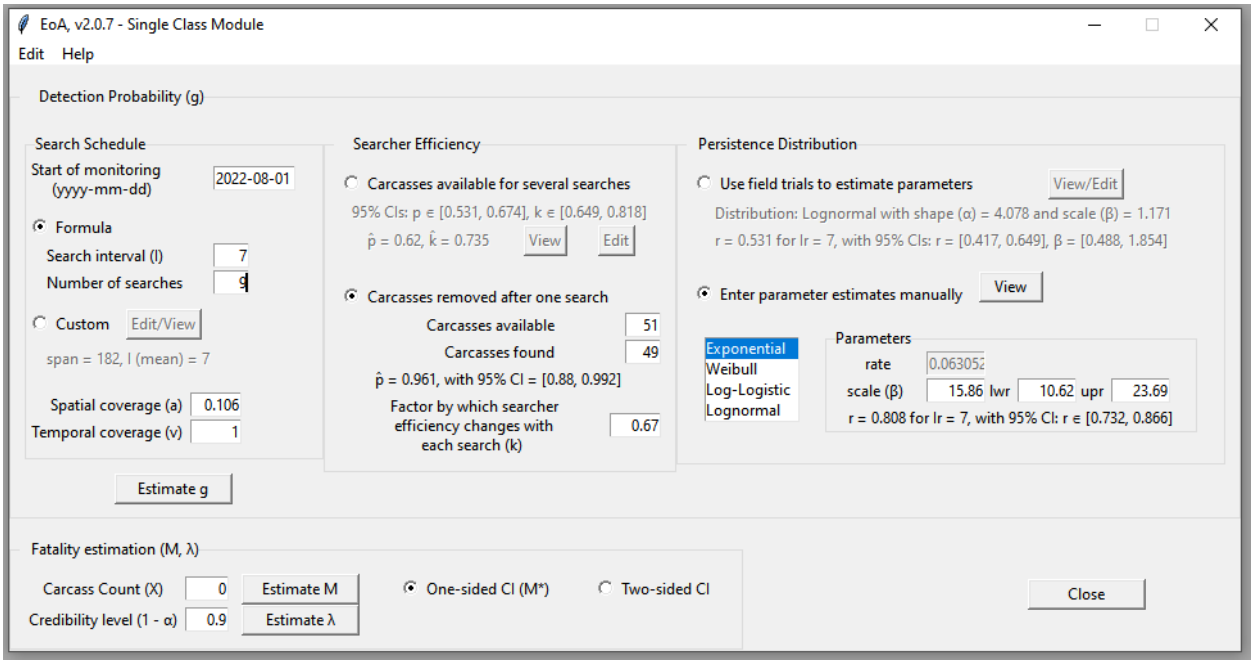


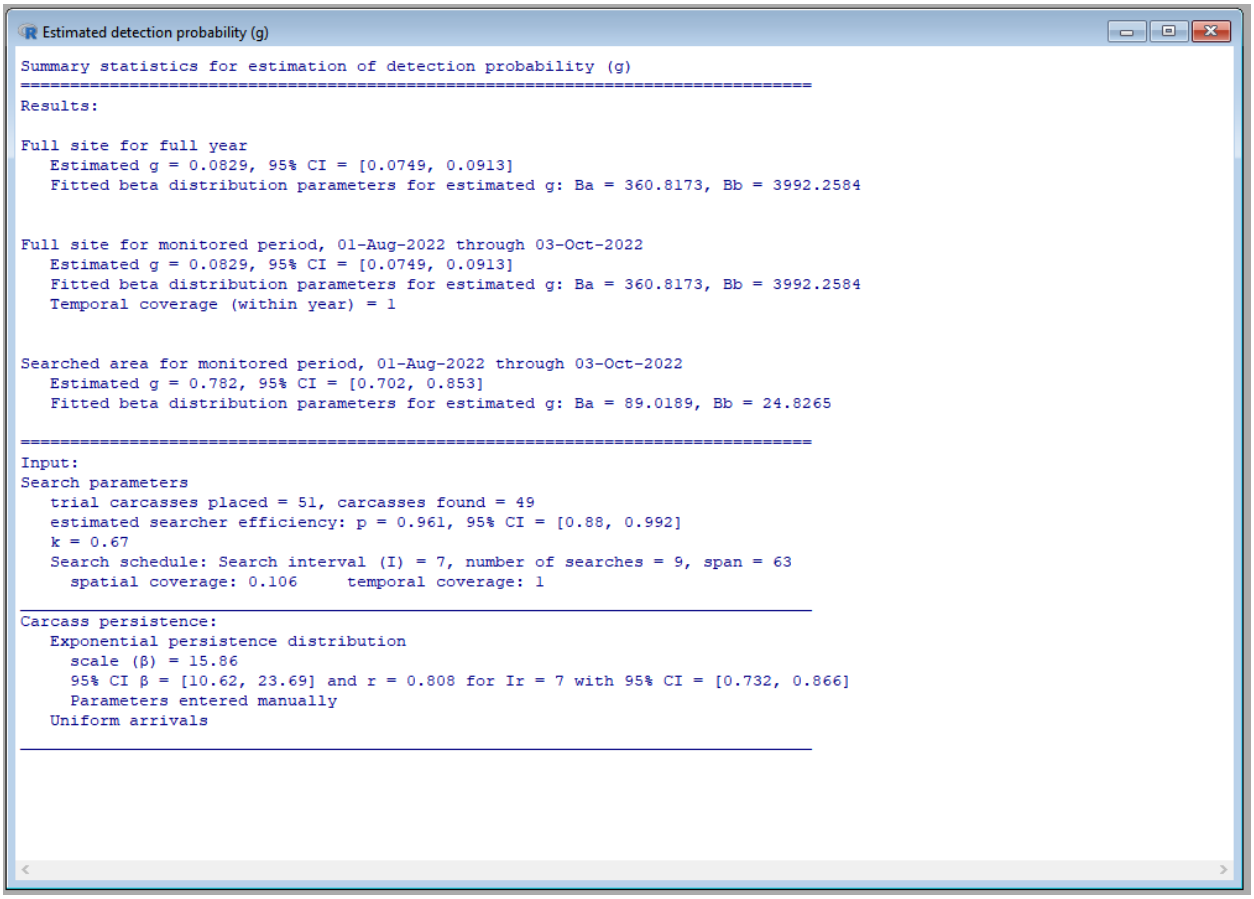
Appendix D24. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 100-meter road and pad searches at 14 turbines with a blade length of 38.5 meters, searched at a 7-day interval.



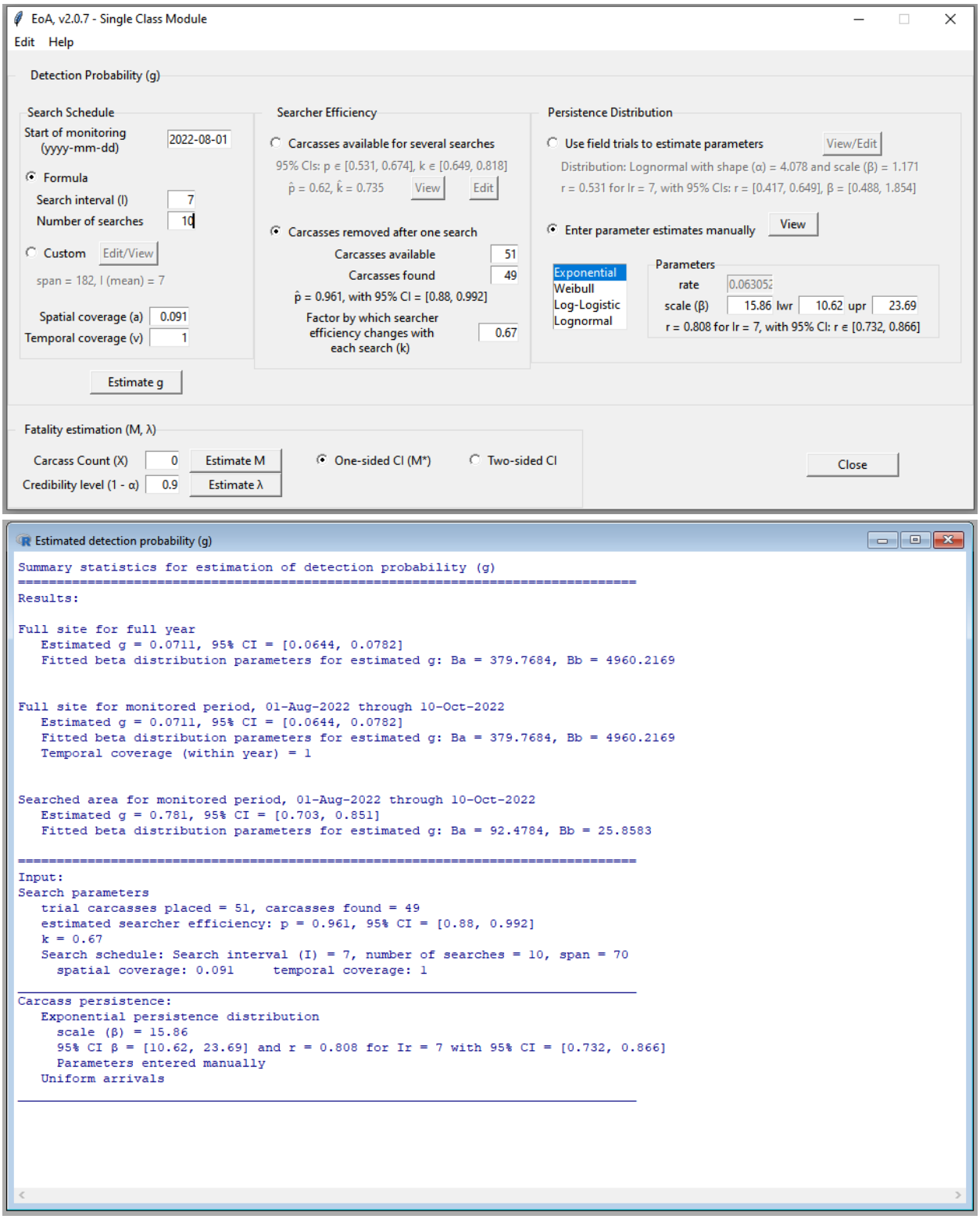


Appendix D25. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 100-meter road and pad searches at 13 turbines with a blade length of 41 meters (1.5-megawatt turbines), searched at a 7-day interval.

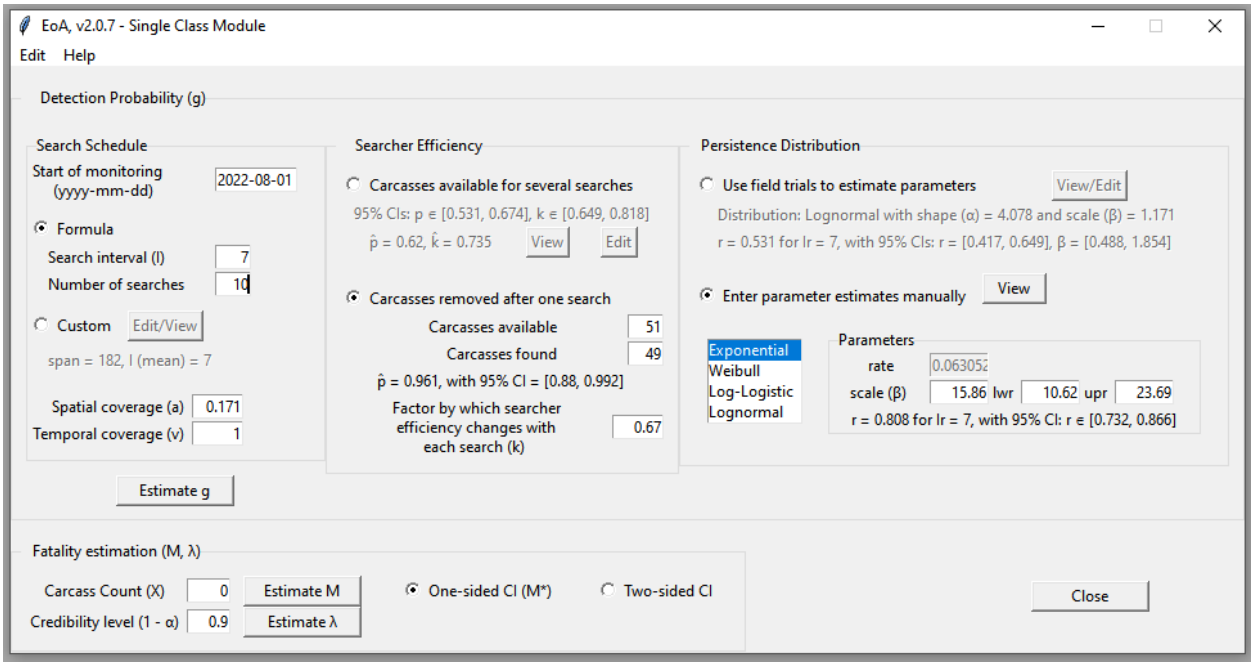


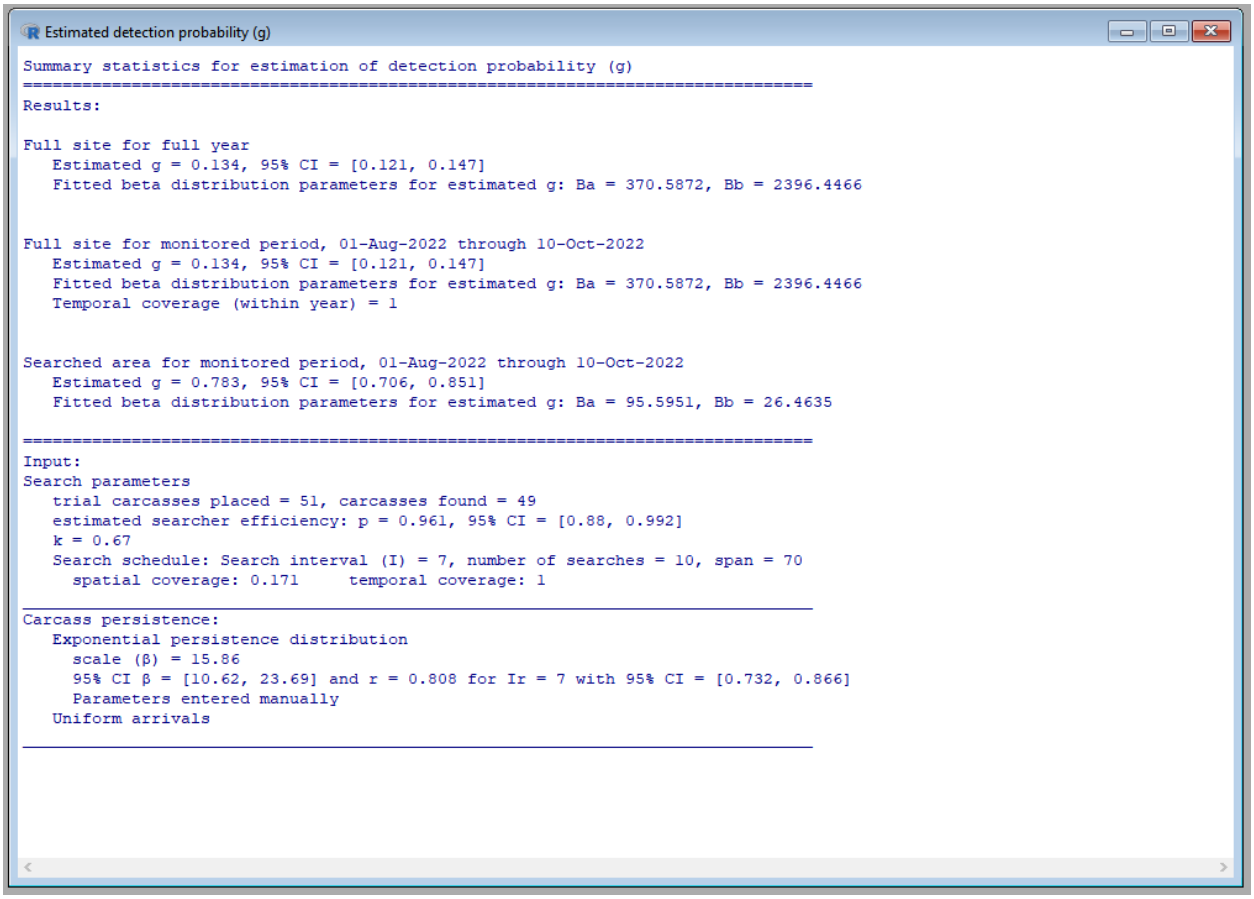


Appendix D26. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 100-meter road and pad searches at 21 turbines with a blade length of 41 meters (1.65-megawatt turbines), searched at a 7-day interval.

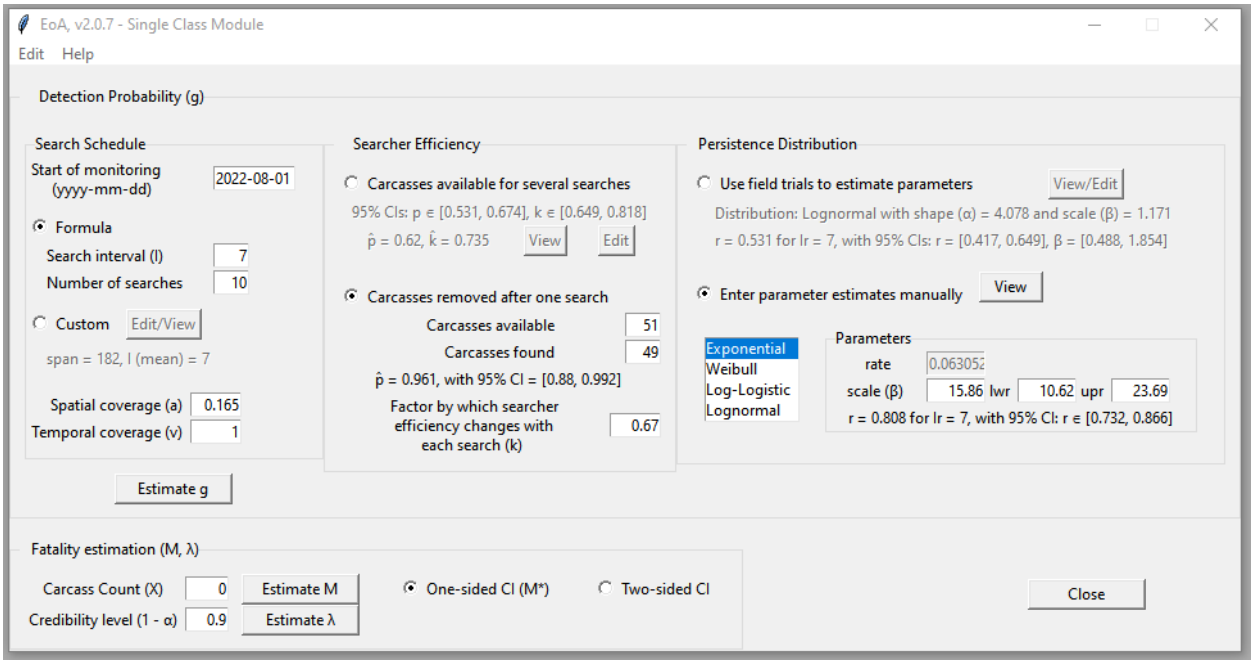


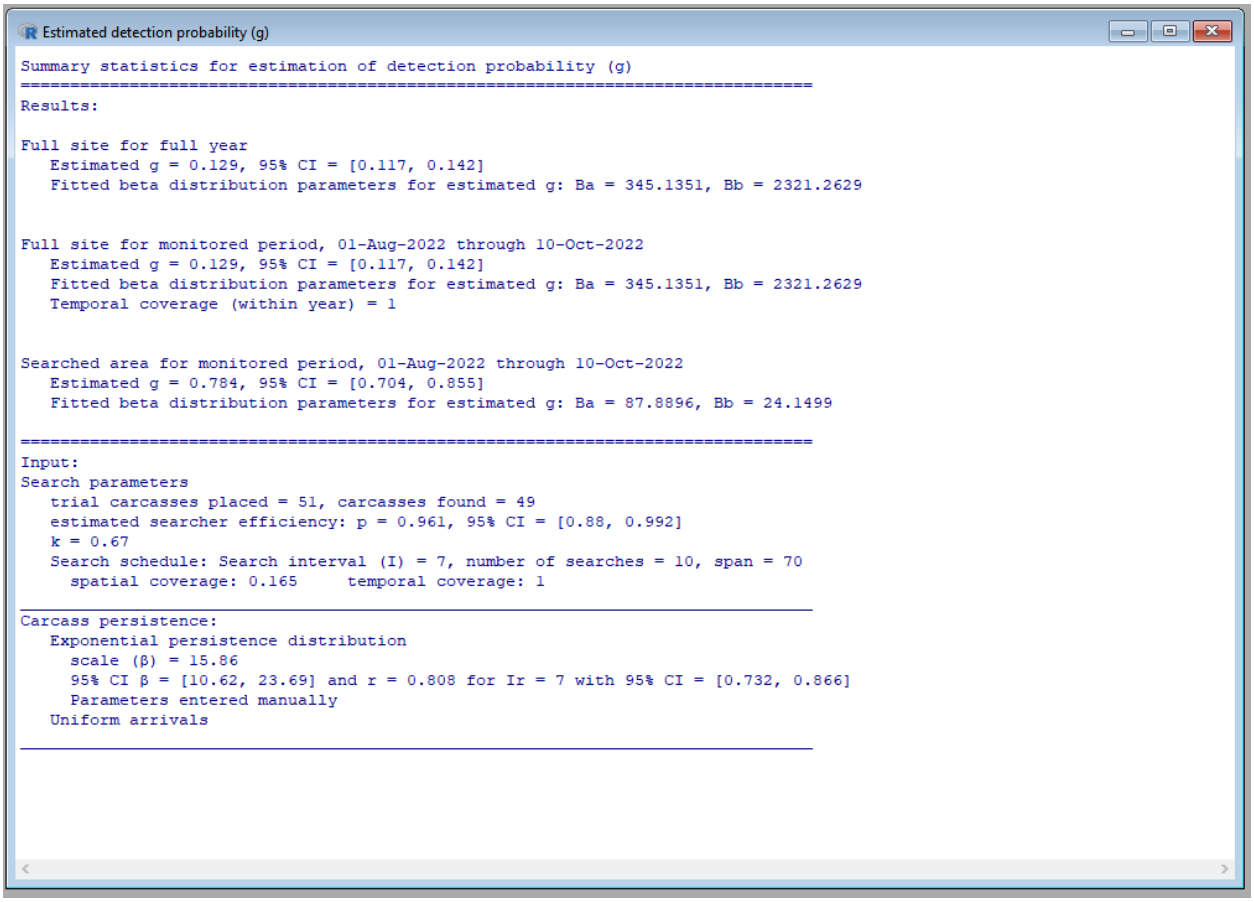
Appendix D27. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 100-meter road and pad searches at eight turbines with a blade length of 44 meters, searched at a 7-day interval.



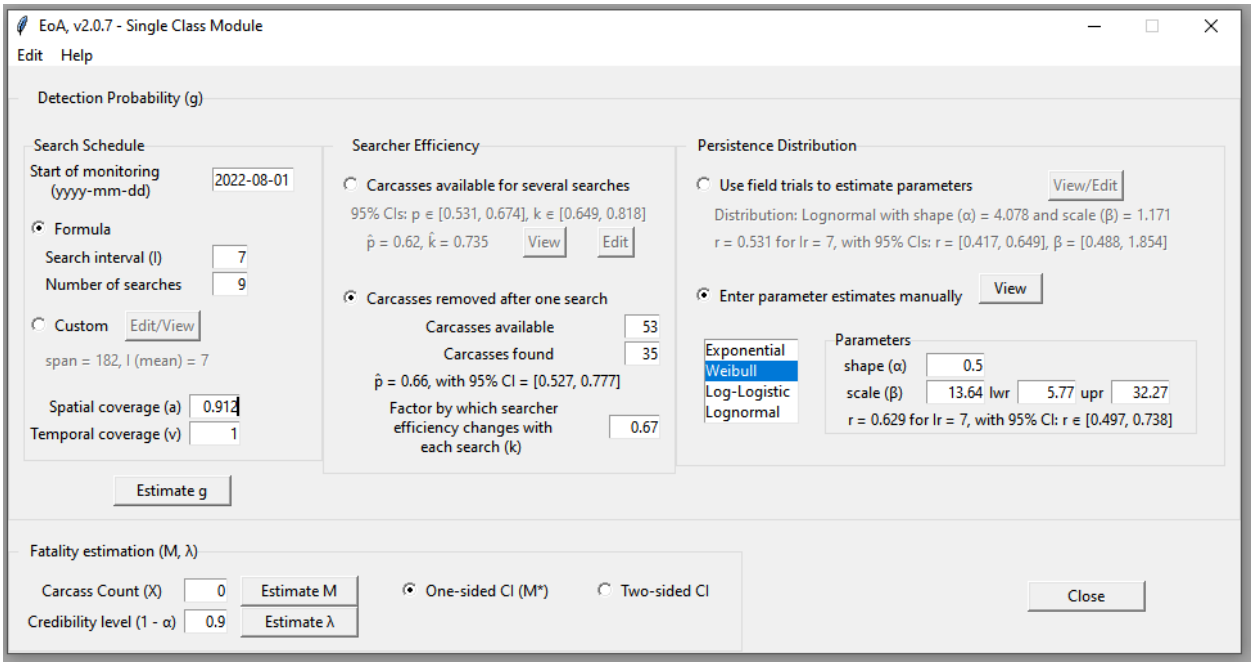


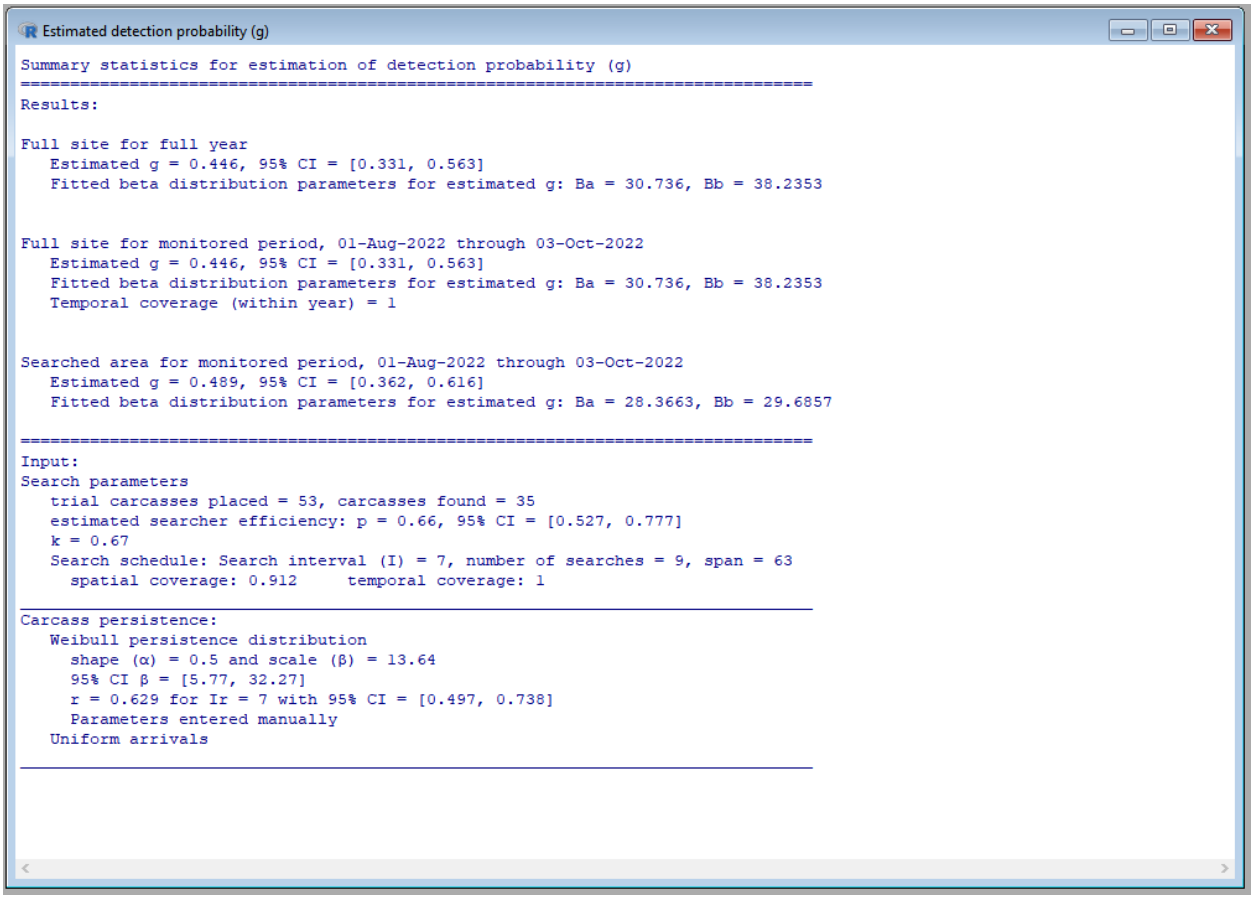
Appendix D28. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 100-meter road and pad searches at eight turbines with a blade length of 55 meters, searched at a 7-day interval.



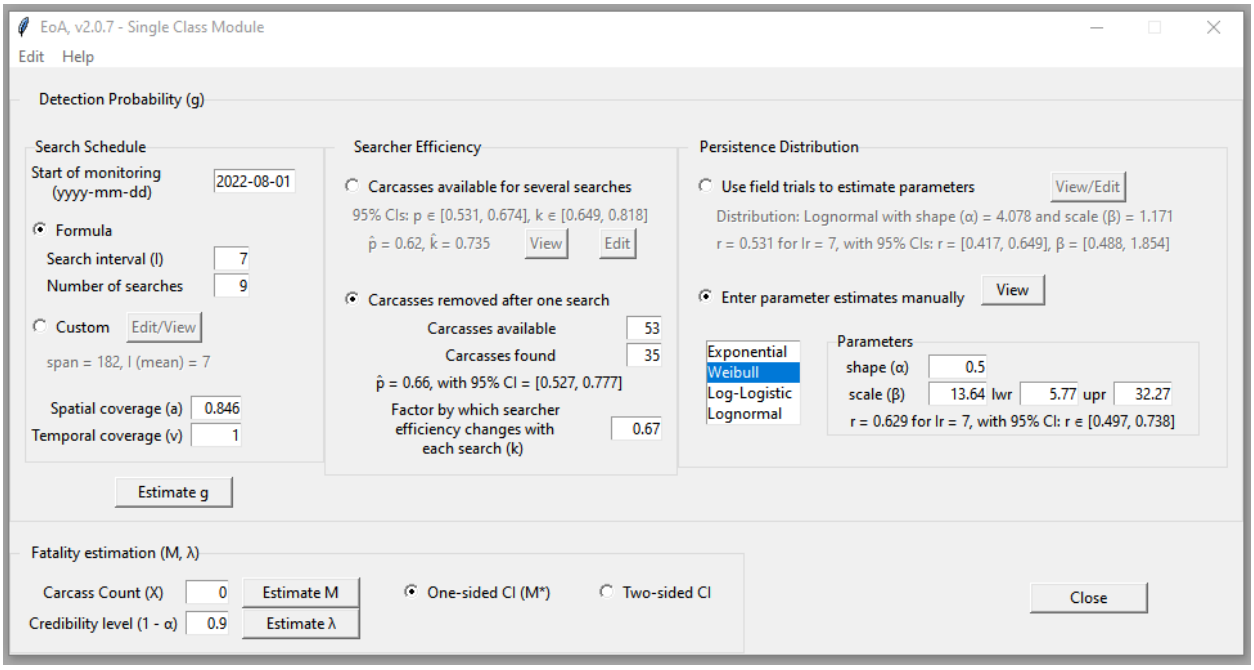


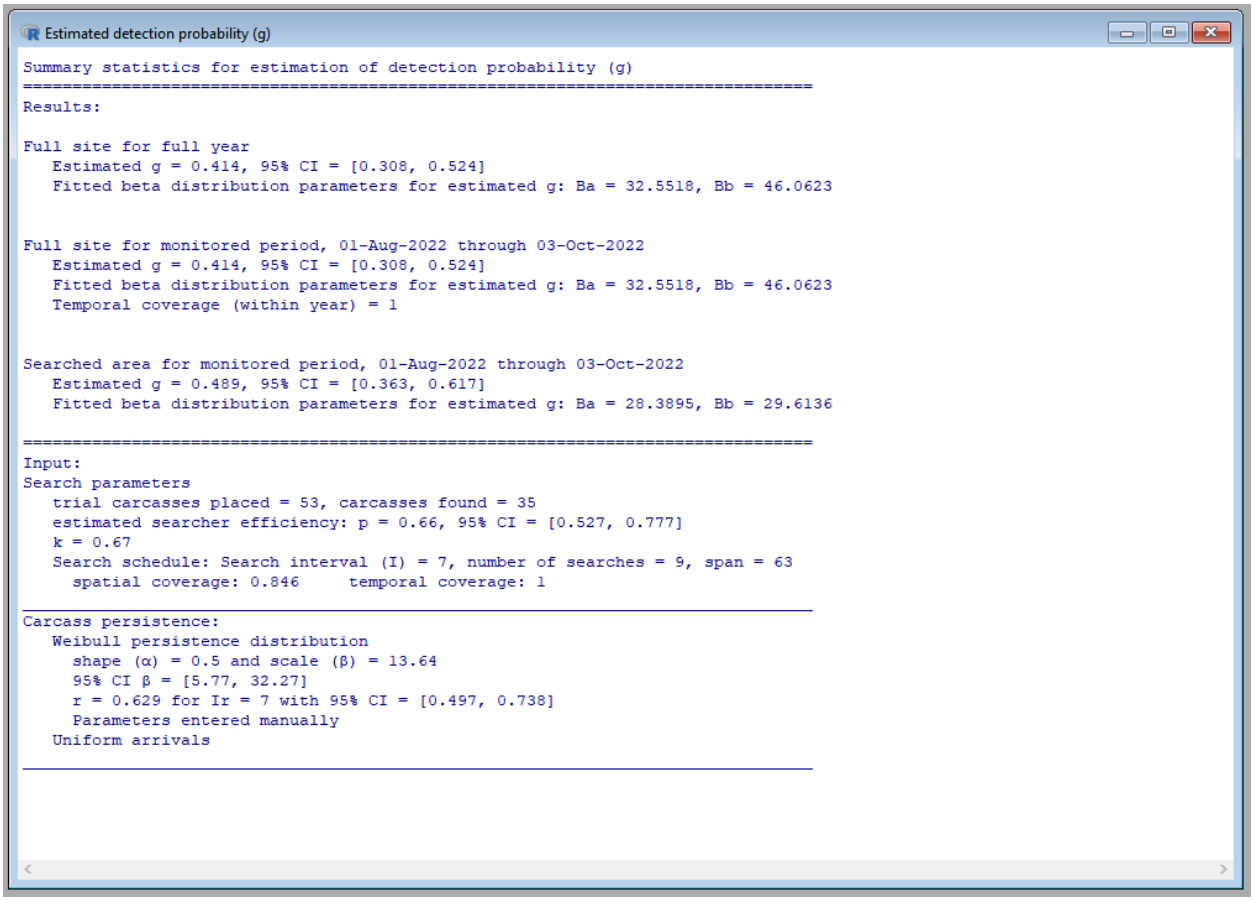
Appendix D29. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 100-meter road and pad searches at nine turbines with a blade length of 68 meters, searched at a 7-day interval.



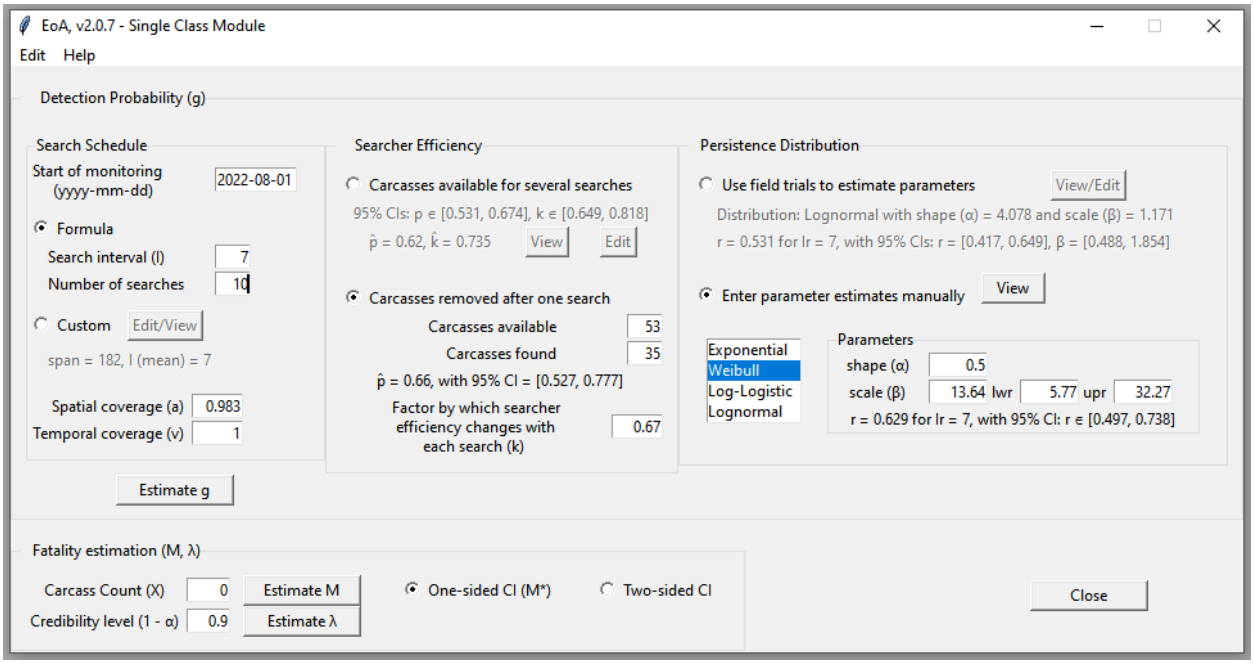


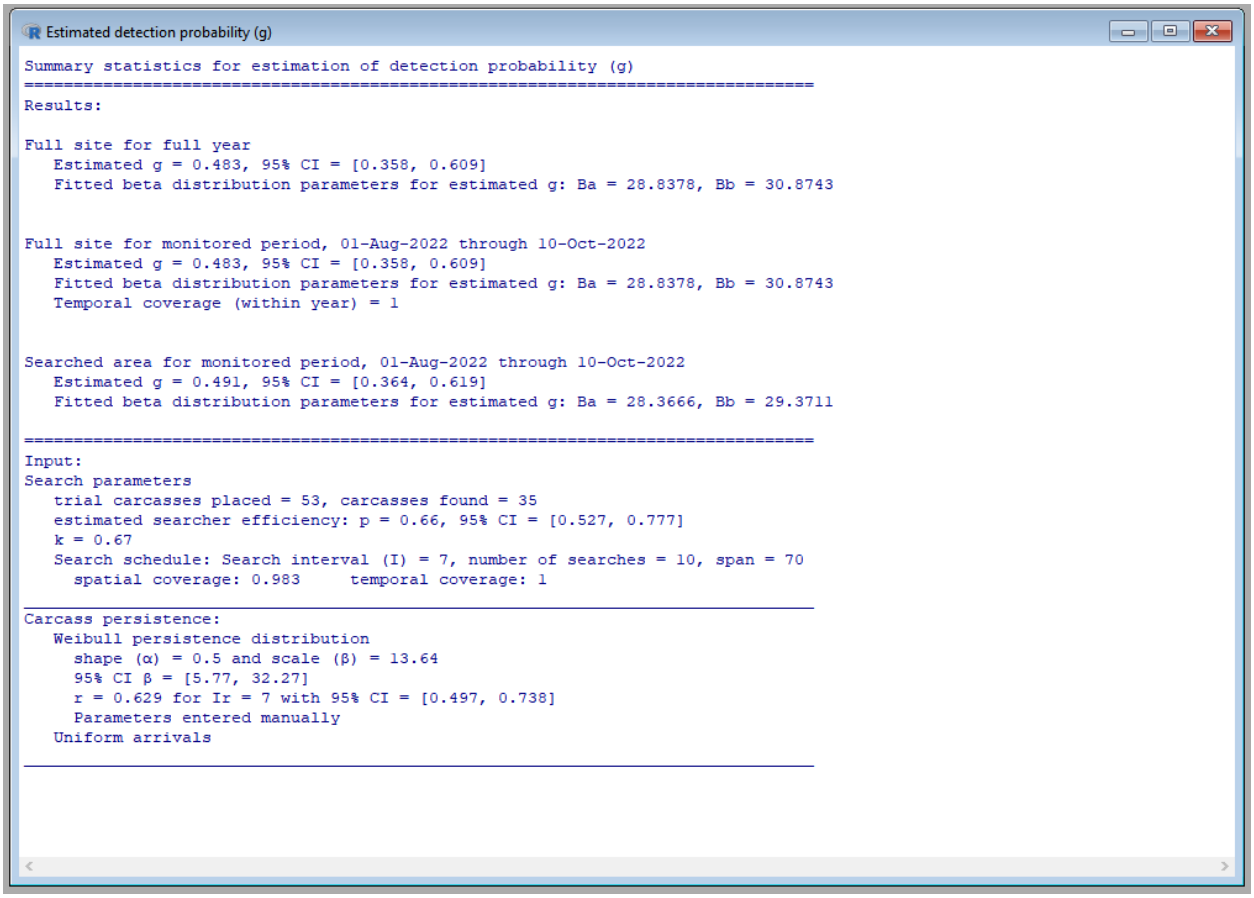
Appendix D30. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 70-meter full plot searches at six turbines with a blade length of 38.5 meters, searched at a 7-day interval.`



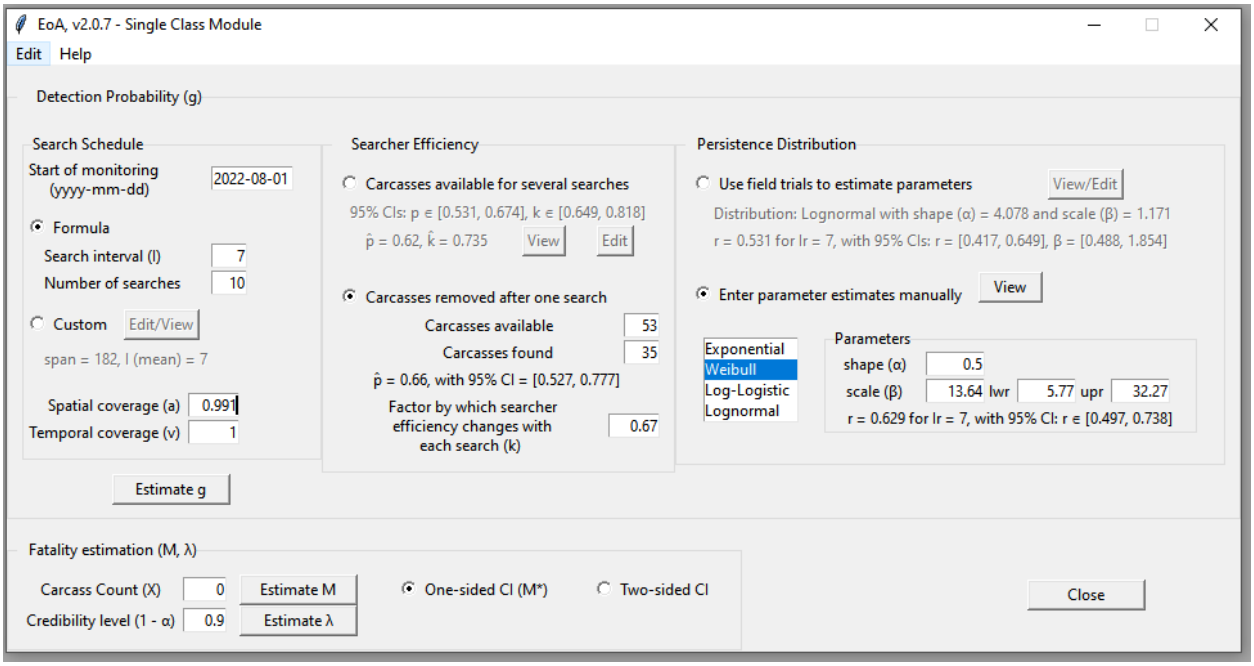


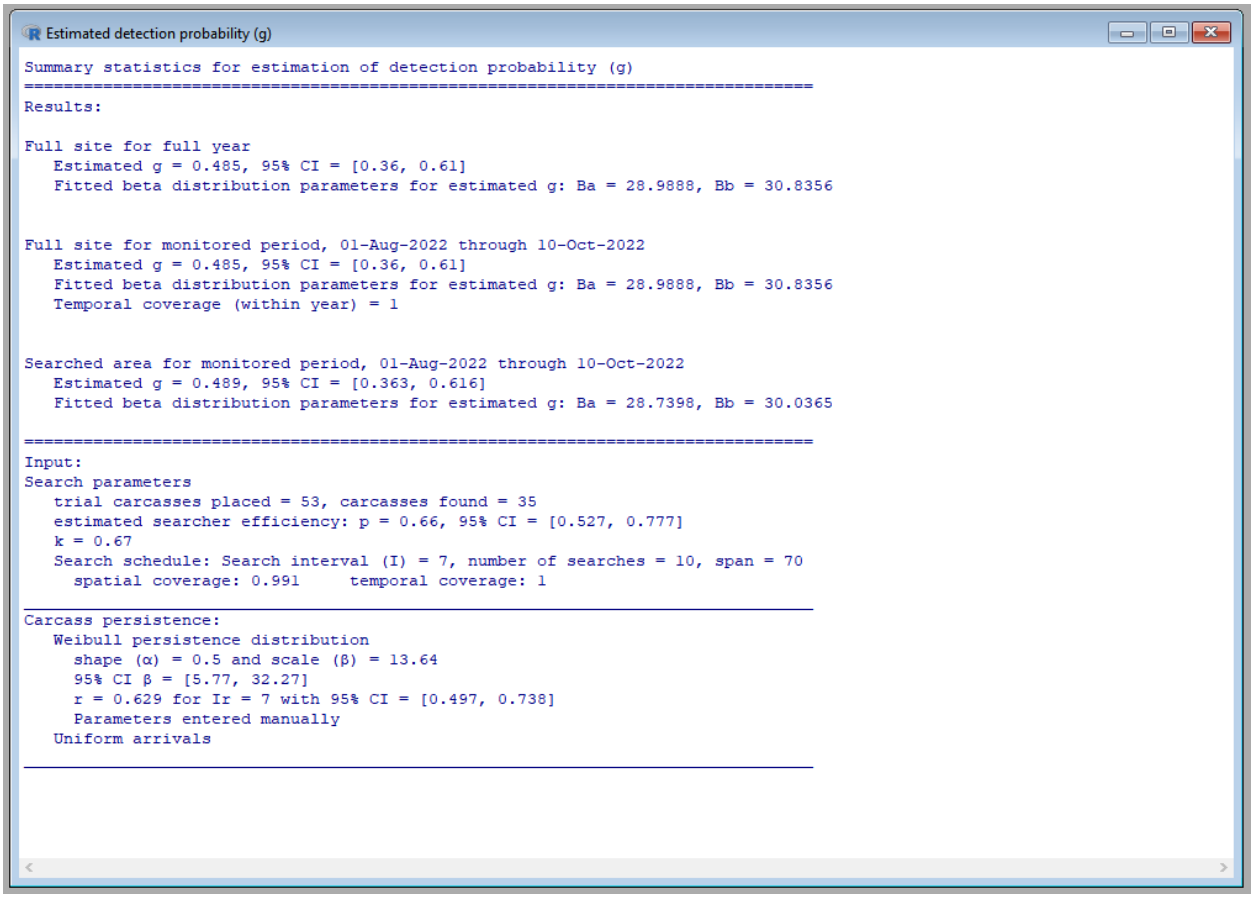
Appendix D31. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 70-meter full plot searches at six turbines with a blade length of 41 meters (1.5-megawatt turbines), searched at a 7-day interval.



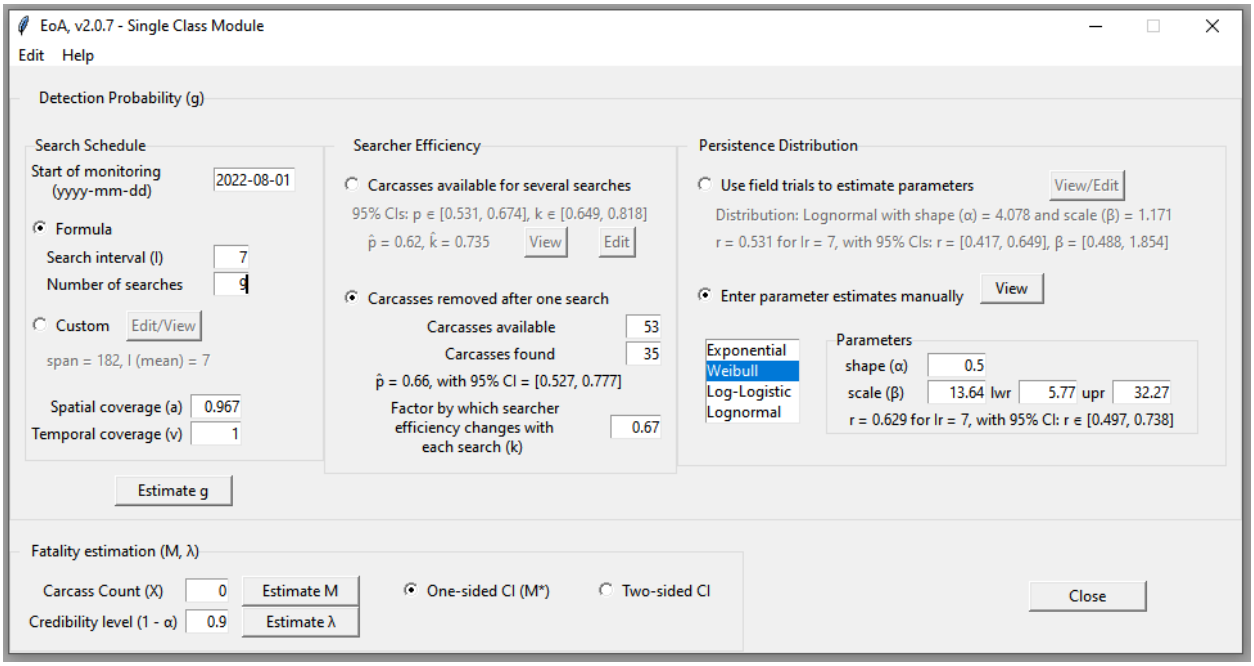


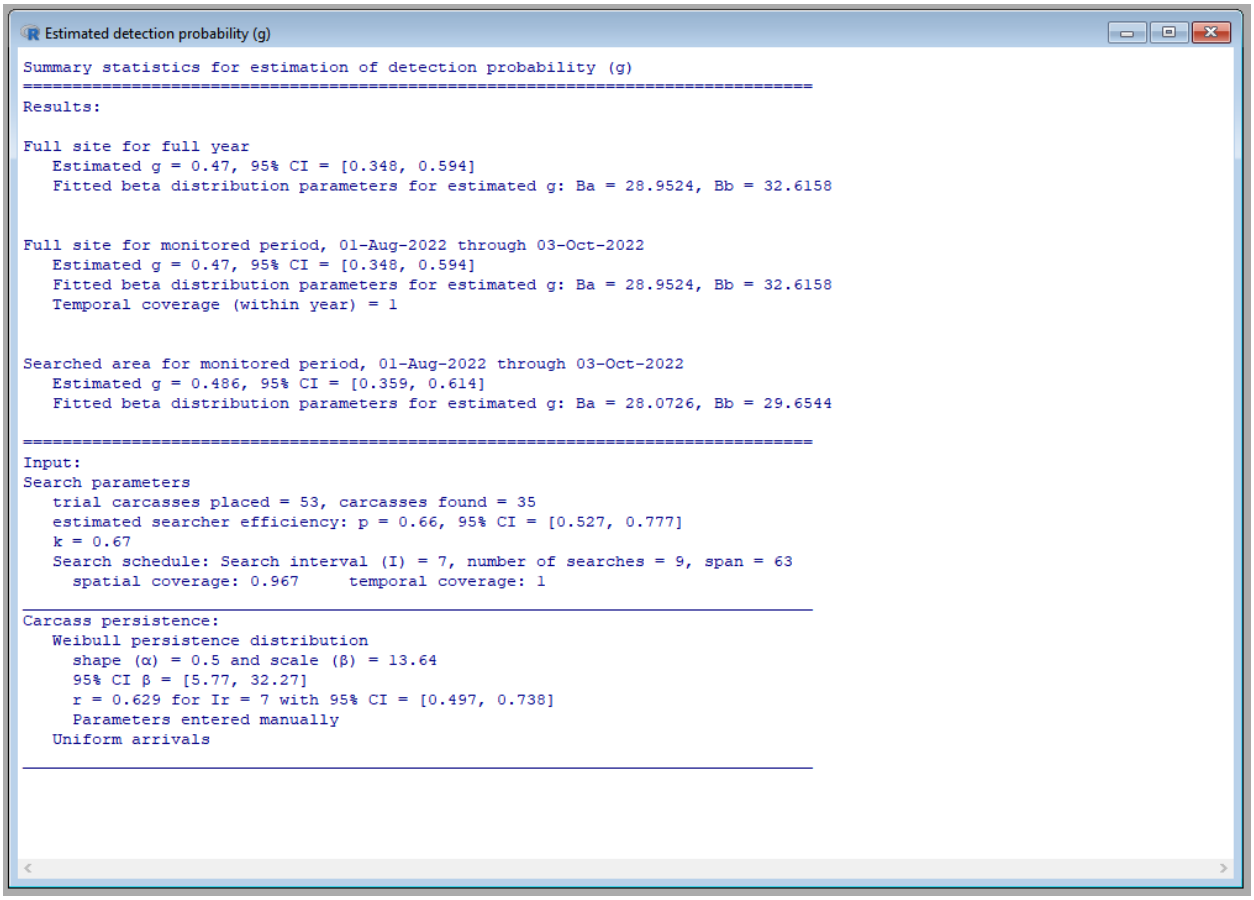
Appendix D32. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 70-meter full plot searches at 12 turbines with a blade length of 41 meters (1.65-megawatt turbines), searched at a 7-day interval.



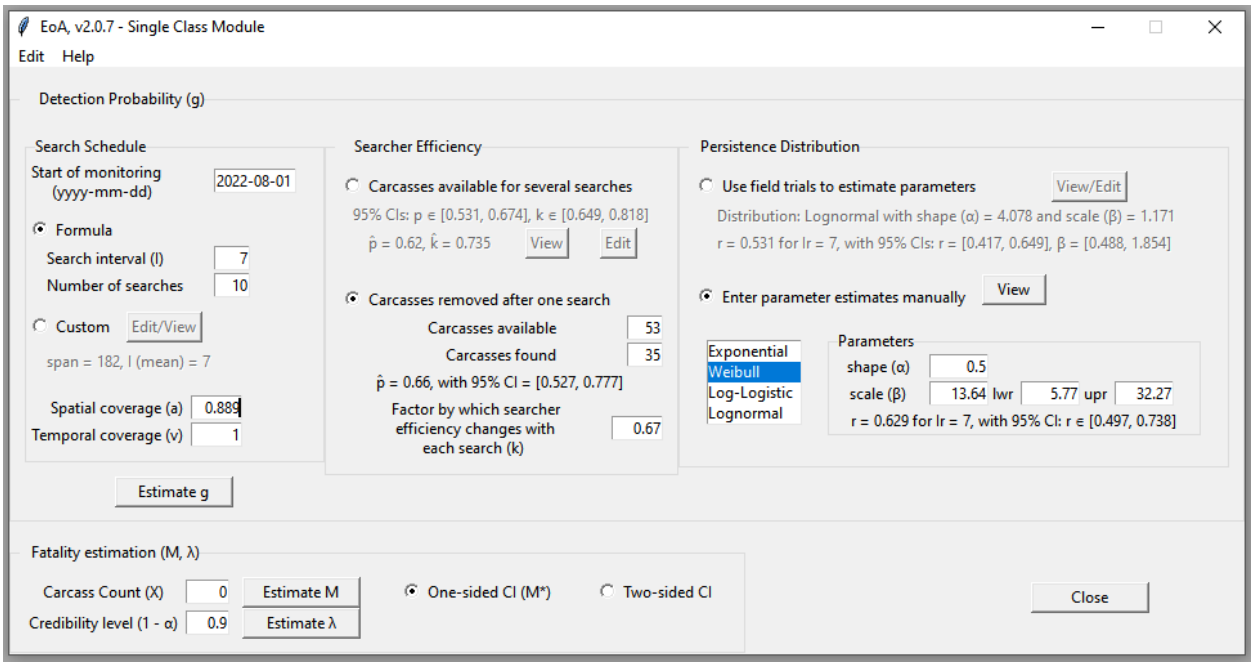


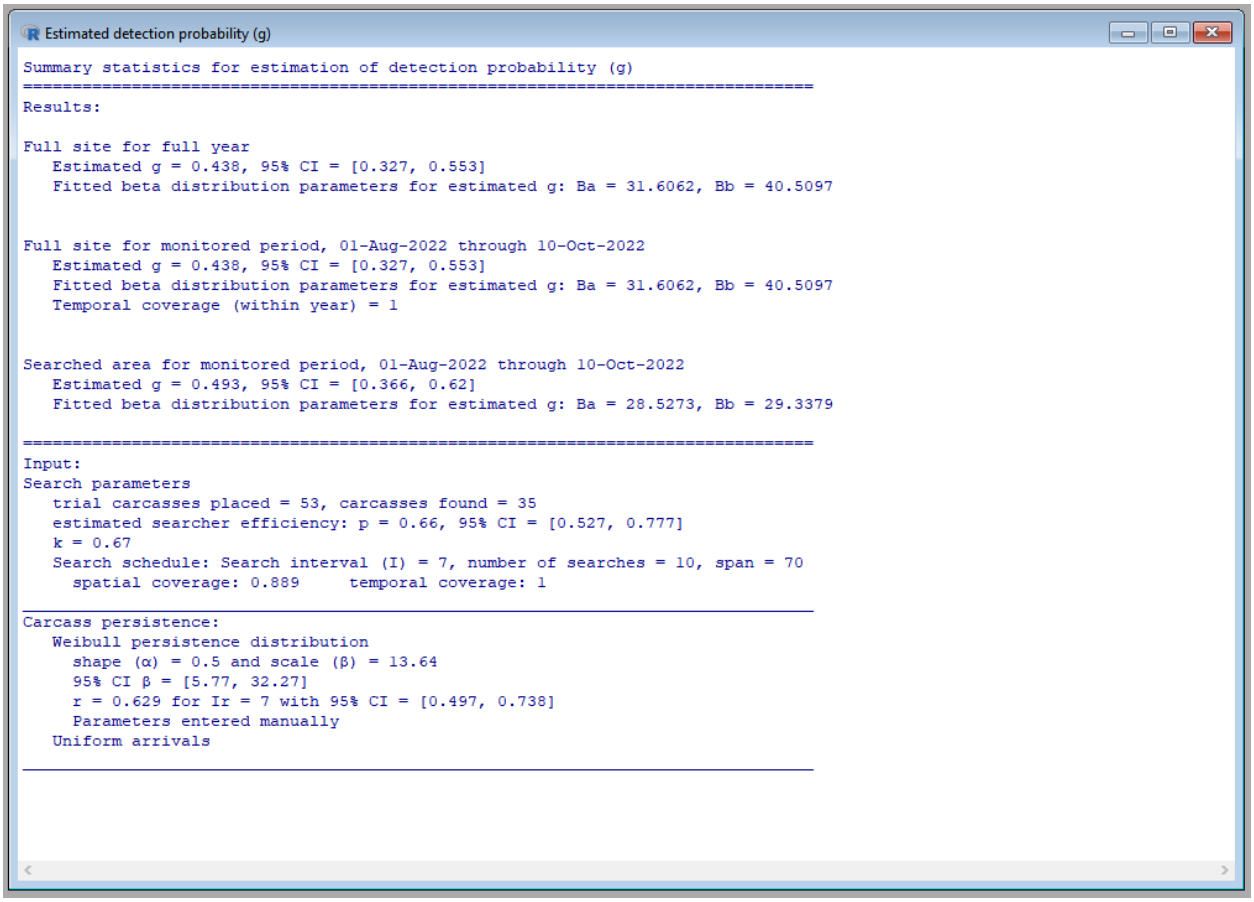
Appendix D33. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 70-meter full plot searches at four turbines with a blade length of 44 meters, searched at a 7-day interval.



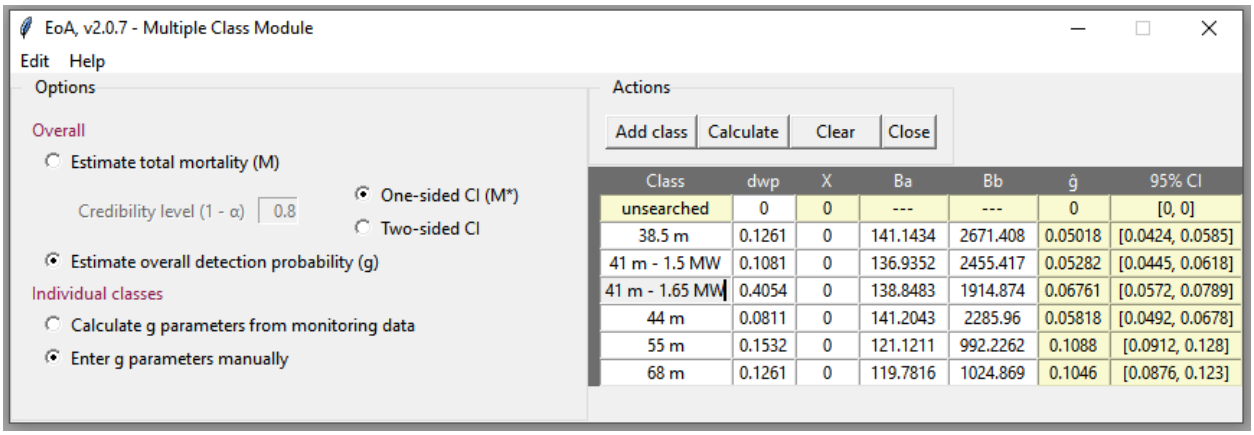


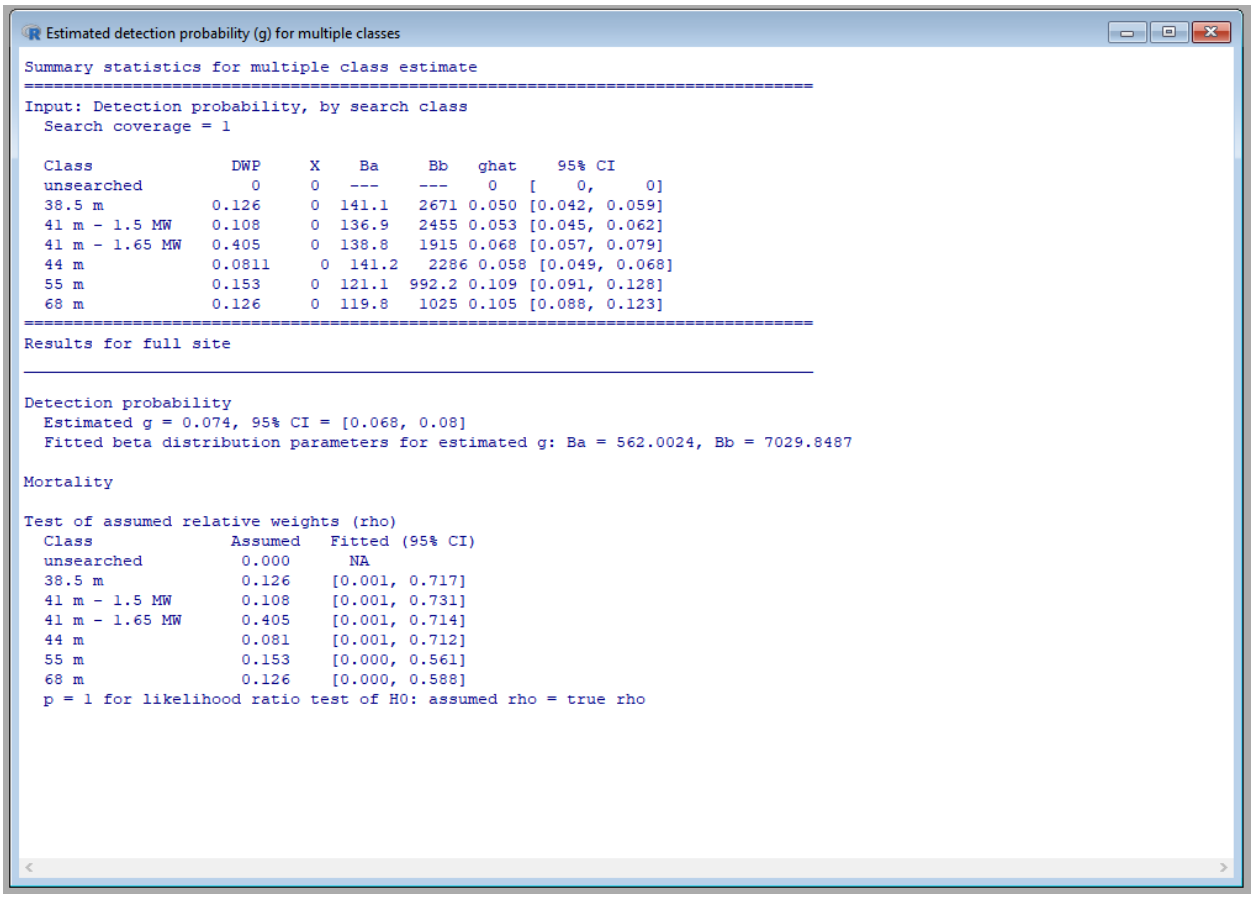
Appendix D34. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 70-meter full plot searches at five turbines with a blade length of 55 meters, searched at a 7-day interval.



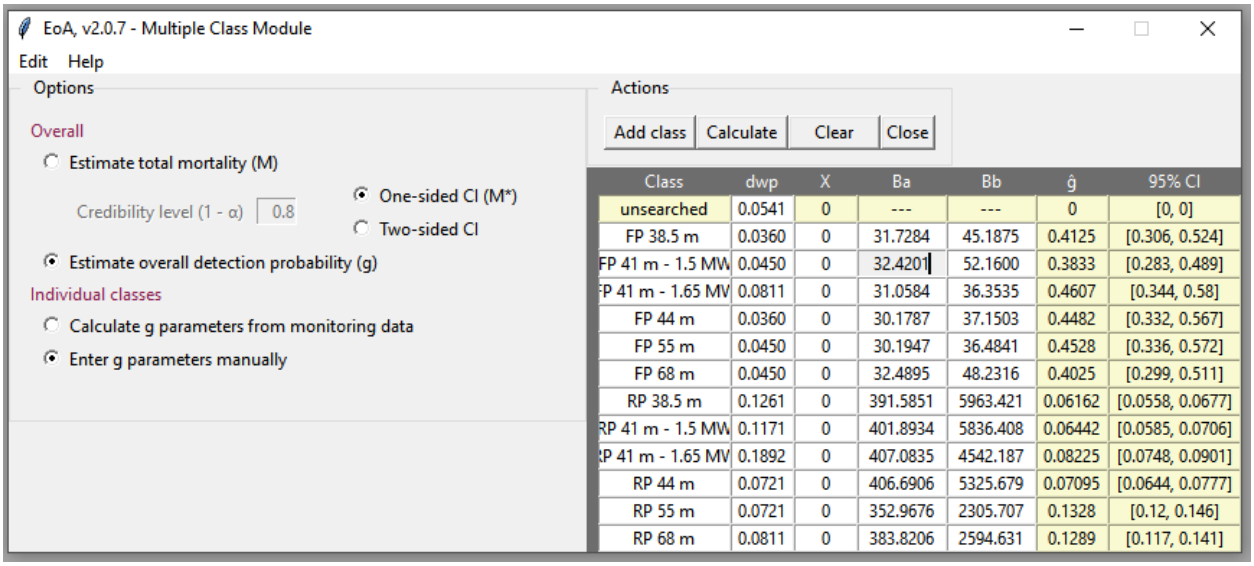


Appendix D35. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2 2022, 70-meter full plot searches at five turbines with a blade length of 68 meters, searched at a 7-day interval.

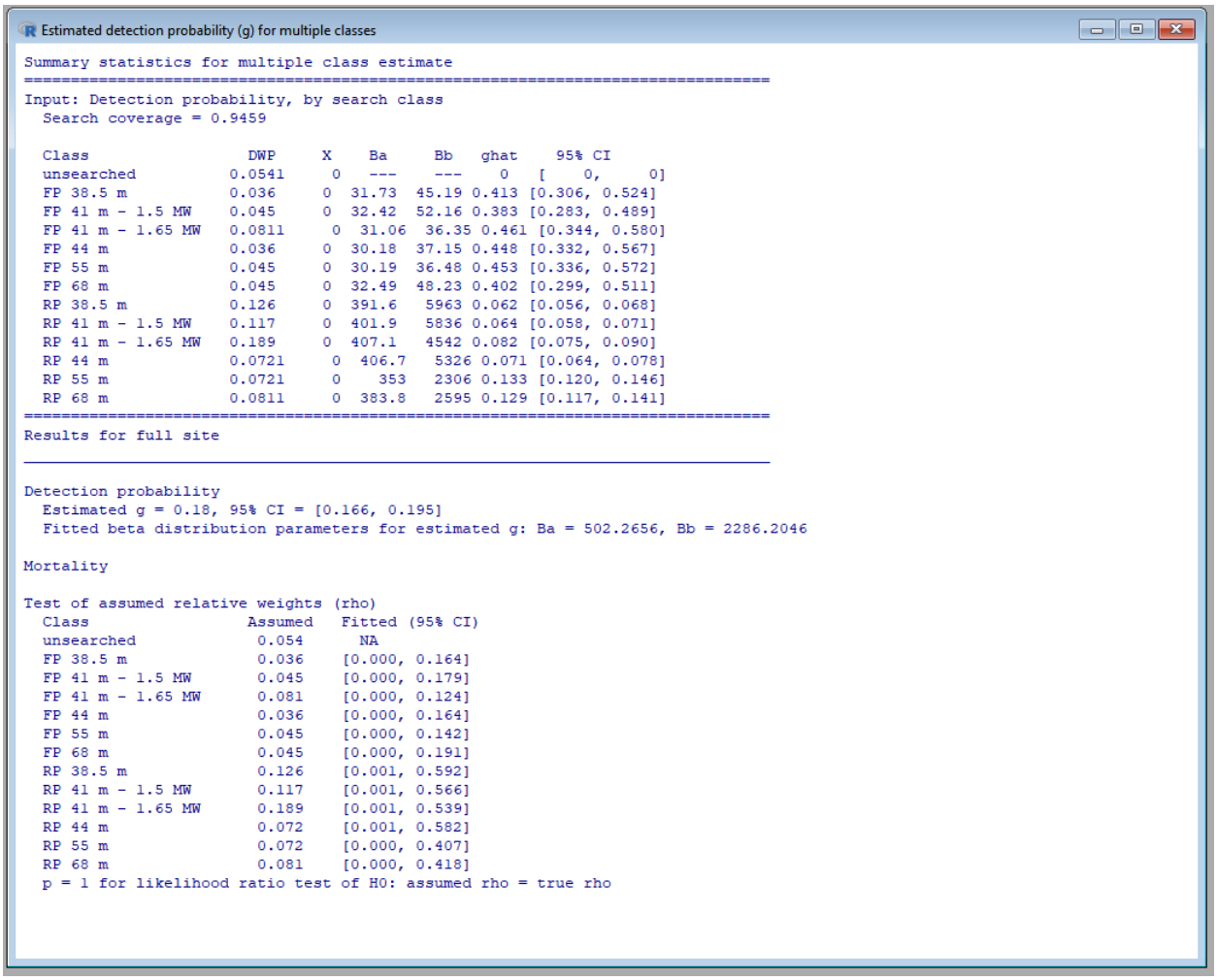




Appendix D36. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs for Spring 2022, searches at 111 turbines, searched at a 14-day interval.



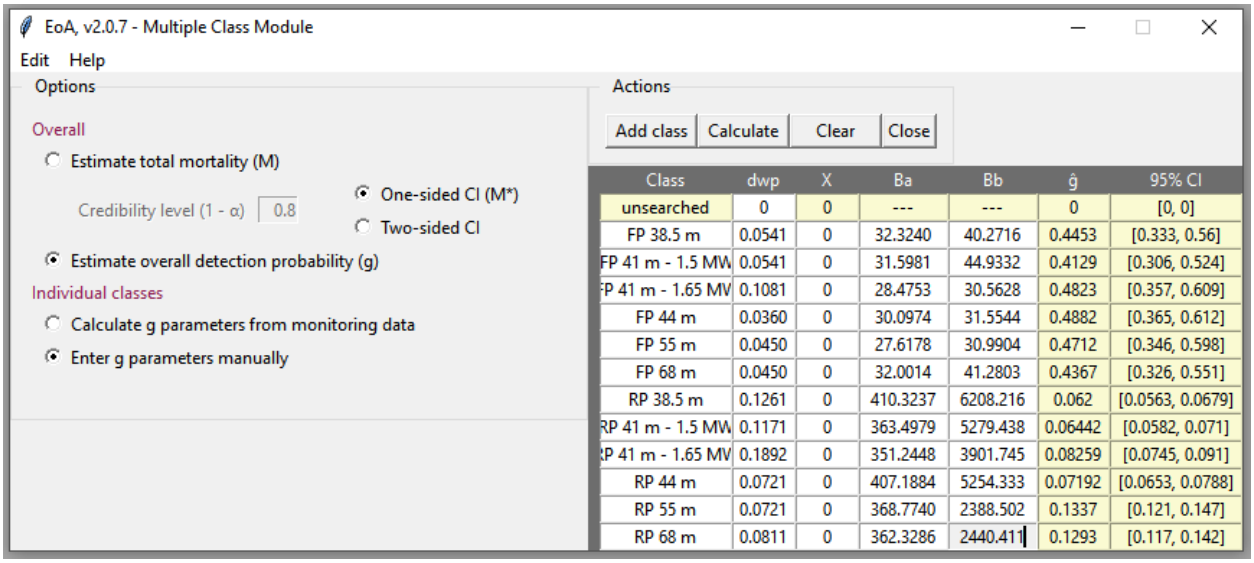
Class	dwp	X	Ba	Bb	ĝ	95% CI
unsearched	0.0541	0	---	---	0	[0, 0]
FP 38.5 m	0.0360	0	31.7284	45.1875	0.4125	[0.306, 0.524]
FP 41 m - 1.5 MW	0.0450	0	32.4201	52.1600	0.3833	[0.283, 0.489]
FP 41 m - 1.65 MW	0.0811	0	31.0584	36.3535	0.4607	[0.344, 0.58]
FP 44 m	0.0360	0	30.1787	37.1503	0.4482	[0.332, 0.567]
FP 55 m	0.0450	0	30.1947	36.4841	0.4528	[0.336, 0.572]
FP 68 m	0.0450	0	32.4895	48.2316	0.4025	[0.299, 0.511]
RP 38.5 m	0.1261	0	391.5851	5963.421	0.06162	[0.0558, 0.0677]
RP 41 m - 1.5 MW	0.1171	0	401.8934	5836.408	0.06442	[0.0585, 0.0706]
RP 41 m - 1.65 MW	0.1892	0	407.0835	4542.187	0.08225	[0.0748, 0.0901]
RP 44 m	0.0721	0	406.6906	5325.679	0.07095	[0.0644, 0.0777]
RP 55 m	0.0721	0	352.9676	2305.707	0.1328	[0.12, 0.146]
RP 68 m	0.0811	0	383.8206	2594.631	0.1289	[0.117, 0.141]



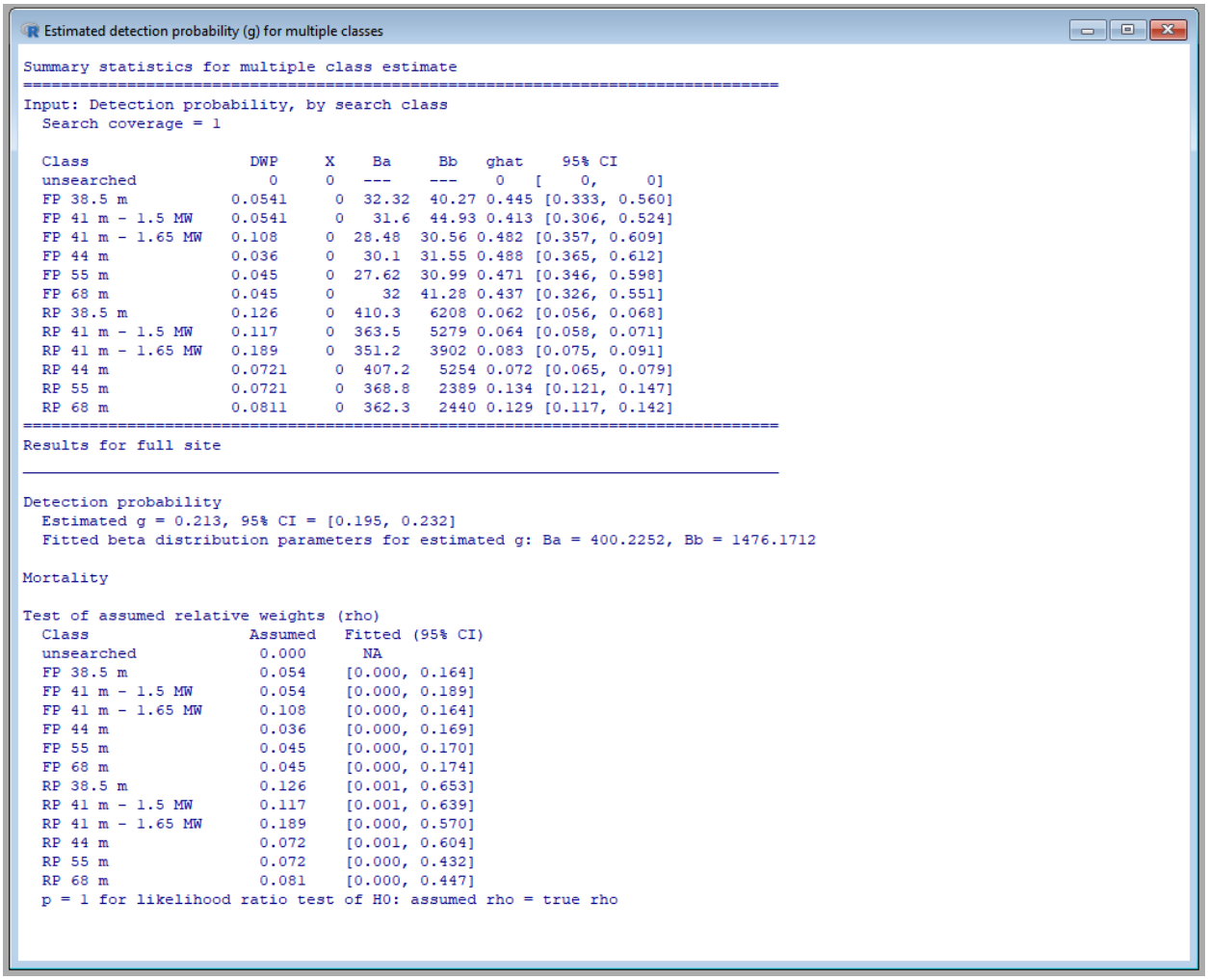
Estimated detection probability (g) for multiple classes

```
Summary statistics for multiple class estimate
================================================================================
Input: Detection probability, by search class
  Search coverage = 0.9459

  Class                 DWP     X    Ba     Bb   ghat    95% CI
  unsearched          0.0541     0   ---    ---    0   [    0,     0]
  FP 38.5 m           0.036      0  31.73  45.19 0.413 [0.306, 0.524]
  FP 41 m - 1.5 MW    0.045      0  32.42  52.16 0.383 [0.283, 0.489]
  FP 41 m - 1.65 MW   0.0811     0  31.06  36.35 0.461 [0.344, 0.580]
  FP 44 m             0.036      0  30.18  37.15 0.448 [0.332, 0.567]
  FP 55 m             0.045      0  30.19  36.48 0.453 [0.336, 0.572]
  FP 68 m             0.045      0  32.49  48.23 0.402 [0.299, 0.511]
  RP 38.5 m           0.126      0  391.6   5963 0.062 [0.056, 0.068]
  RP 41 m - 1.5 MW    0.117      0  401.9   5836 0.064 [0.058, 0.071]
  RP 41 m - 1.65 MW   0.189      0  407.1   4542 0.082 [0.075, 0.090]
  RP 44 m             0.0721     0  406.7   5326 0.071 [0.064, 0.078]
  RP 55 m             0.0721     0    353   2306 0.133 [0.120, 0.146]
  RP 68 m             0.0811     0  383.8   2595 0.129 [0.117, 0.141]
================================================================================
Results for full site
________________________________________________________________________________

Detection probability
  Estimated g = 0.18, 95% CI = [0.166, 0.195]
  Fitted beta distribution parameters for estimated g: Ba = 502.2656, Bb = 2286.2046

Mortality

Test of assumed relative weights (rho)
  Class                Assumed   Fitted (95% CI)
  unsearched             0.054      NA
  FP 38.5 m              0.036    [0.000, 0.164]
  FP 41 m - 1.5 MW       0.045    [0.000, 0.179]
  FP 41 m - 1.65 MW      0.081    [0.000, 0.124]
  FP 44 m                0.036    [0.000, 0.164]
  FP 55 m                0.045    [0.000, 0.142]
  FP 68 m                0.045    [0.000, 0.191]
  RP 38.5 m              0.126    [0.001, 0.592]
  RP 41 m - 1.5 MW       0.117    [0.001, 0.566]
  RP 41 m - 1.65 MW      0.189    [0.001, 0.539]
  RP 44 m                0.072    [0.001, 0.582]
  RP 55 m                0.072    [0.000, 0.407]
  RP 68 m                0.081    [0.000, 0.418]
  p = 1 for likelihood ratio test of H0: assumed rho = true rho
```

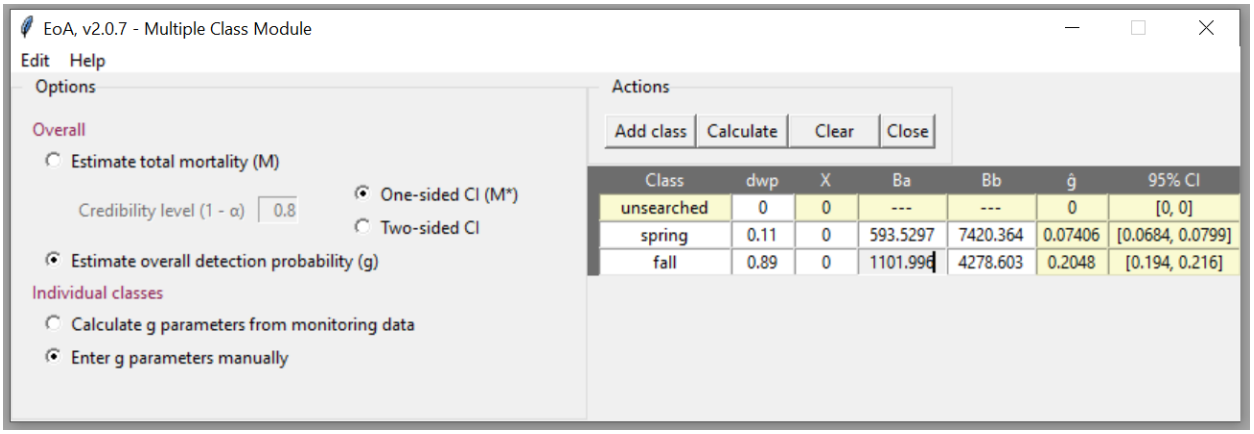
Appendix D37. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs for Fall 1 2022, searches at 105 turbines, searched at a 7-day interval.

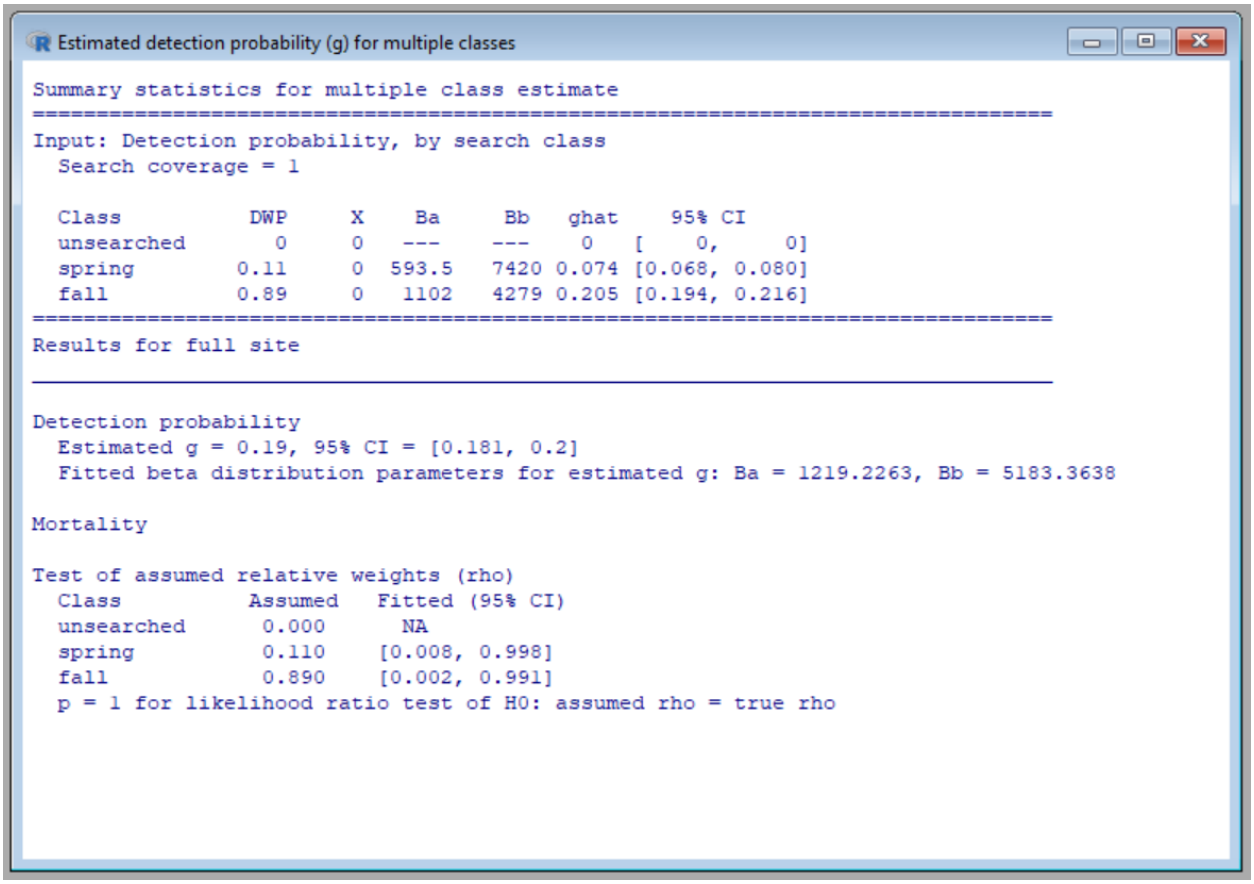


Class	dwp	X	Ba	Bb	ĝ	95% CI
unsearched	0	0	---	---	0	[0, 0]
FP 38.5 m	0.0541	0	32.3240	40.2716	0.4453	[0.333, 0.56]
FP 41 m - 1.5 MW	0.0541	0	31.5981	44.9332	0.4129	[0.306, 0.524]
FP 41 m - 1.65 MW	0.1081	0	28.4753	30.5628	0.4823	[0.357, 0.609]
FP 44 m	0.0360	0	30.0974	31.5544	0.4882	[0.365, 0.612]
FP 55 m	0.0450	0	27.6178	30.9904	0.4712	[0.346, 0.598]
FP 68 m	0.0450	0	32.0014	41.2803	0.4367	[0.326, 0.551]
RP 38.5 m	0.1261	0	410.3237	6208.216	0.062	[0.0563, 0.0679]
RP 41 m - 1.5 MW	0.1171	0	363.4979	5279.438	0.06442	[0.0582, 0.071]
RP 41 m - 1.65 MW	0.1892	0	351.2448	3901.745	0.08259	[0.0745, 0.091]
RP 44 m	0.0721	0	407.1884	5254.333	0.07192	[0.0653, 0.0788]
RP 55 m	0.0721	0	368.7740	2388.502	0.1337	[0.121, 0.147]
RP 68 m	0.0811	0	362.3286	2440.411	0.1293	[0.117, 0.142]

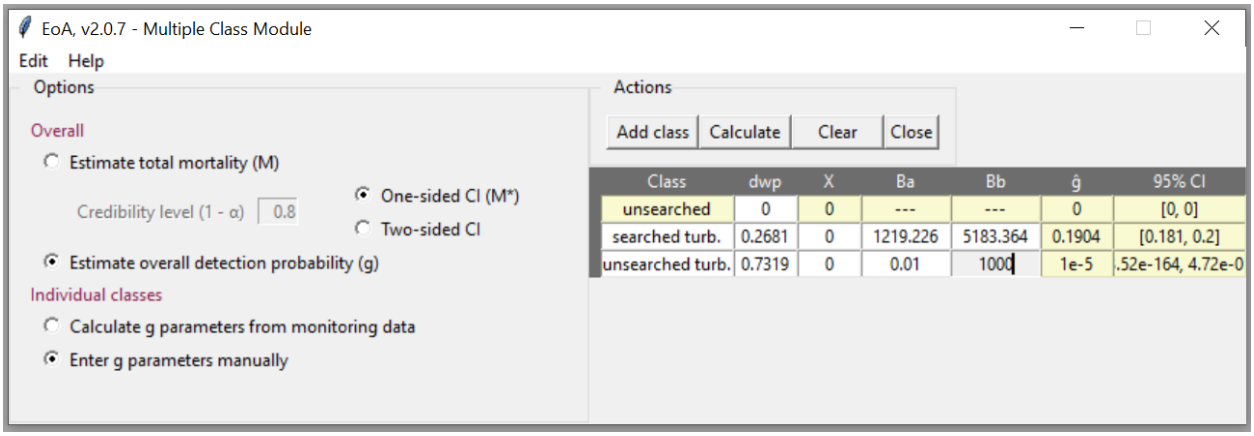


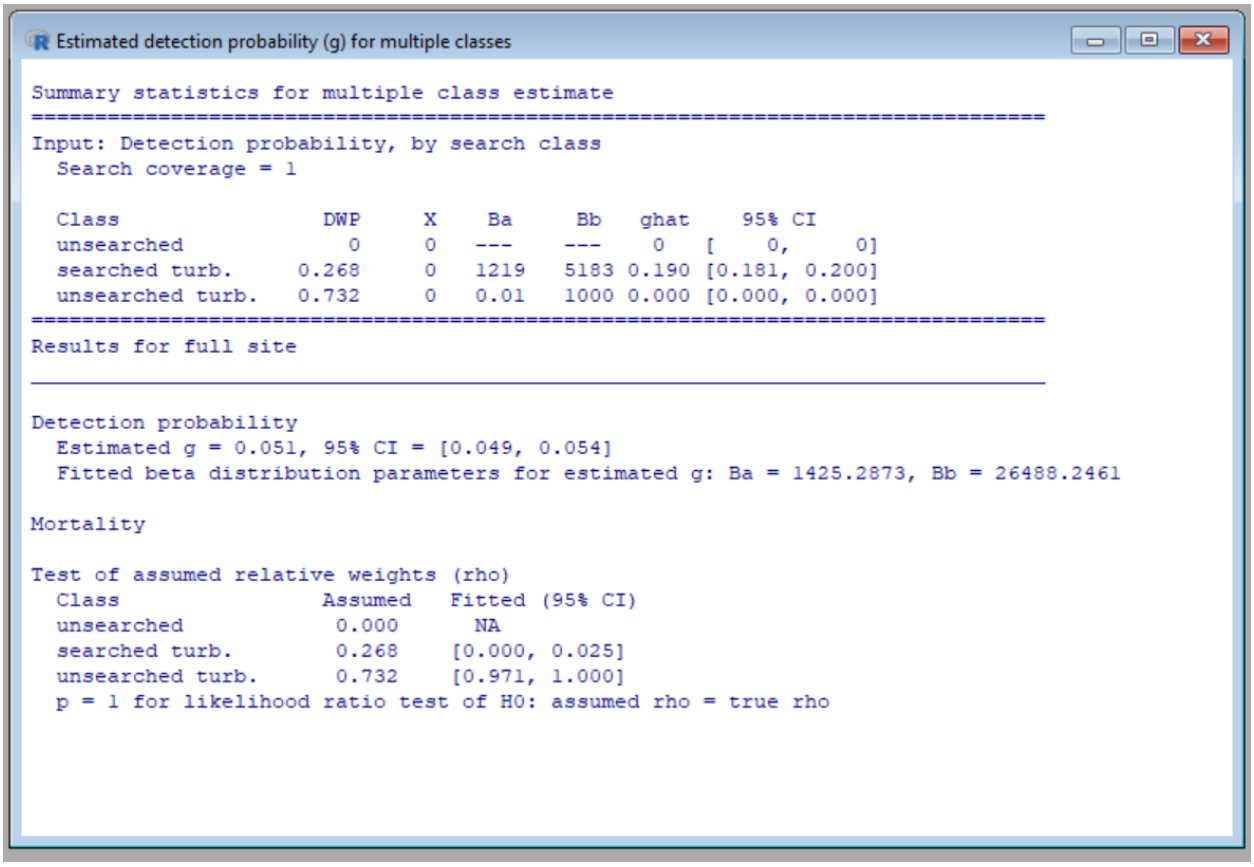
Appendix D38. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs for Fall 2 2022, searches at 111 turbines, searched at a 7-day interval.



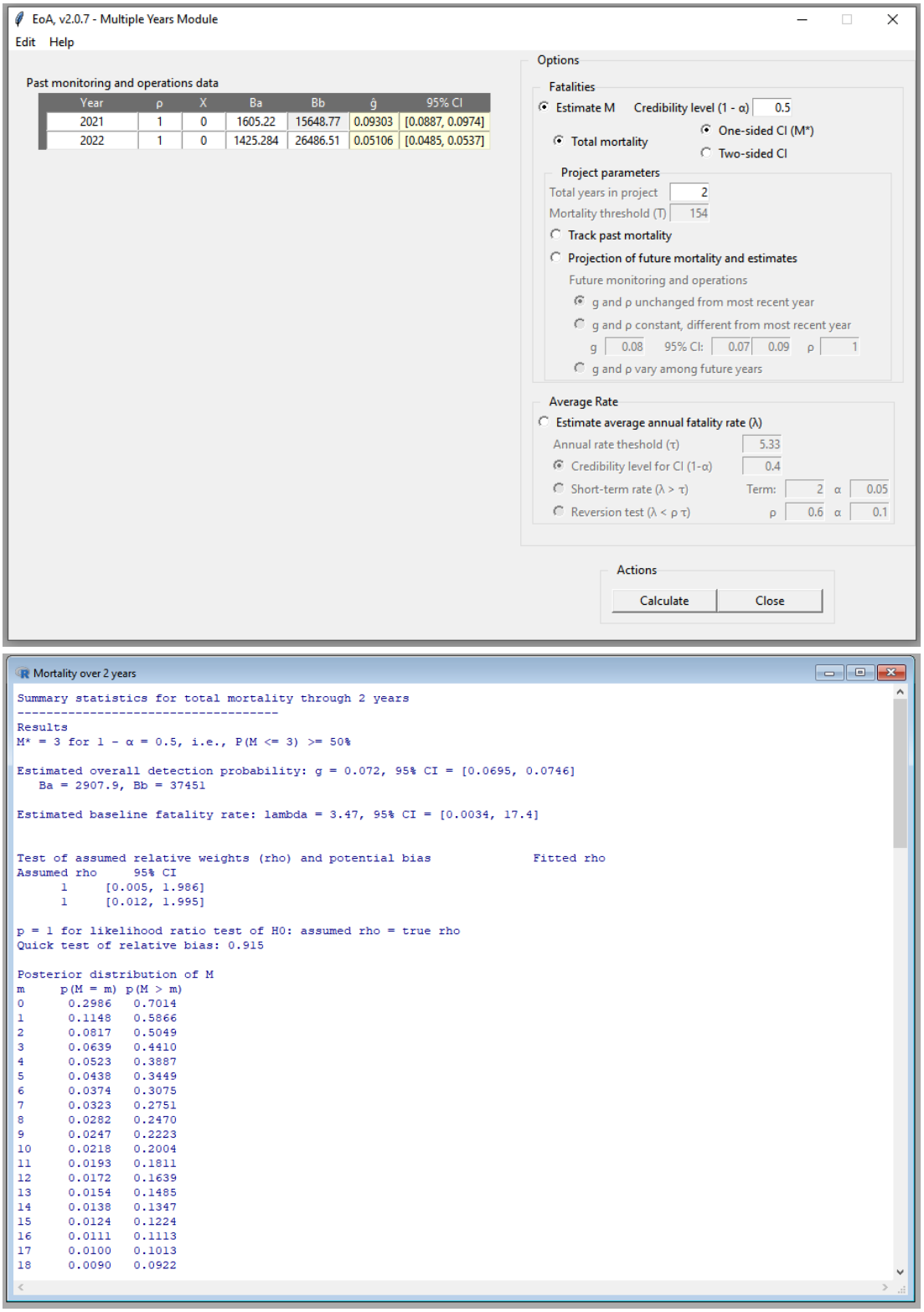


Appendix D39. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs and output for Spring and Fall 2022, searched at a 14-day interval in the spring and a 7-day interval in the fall.

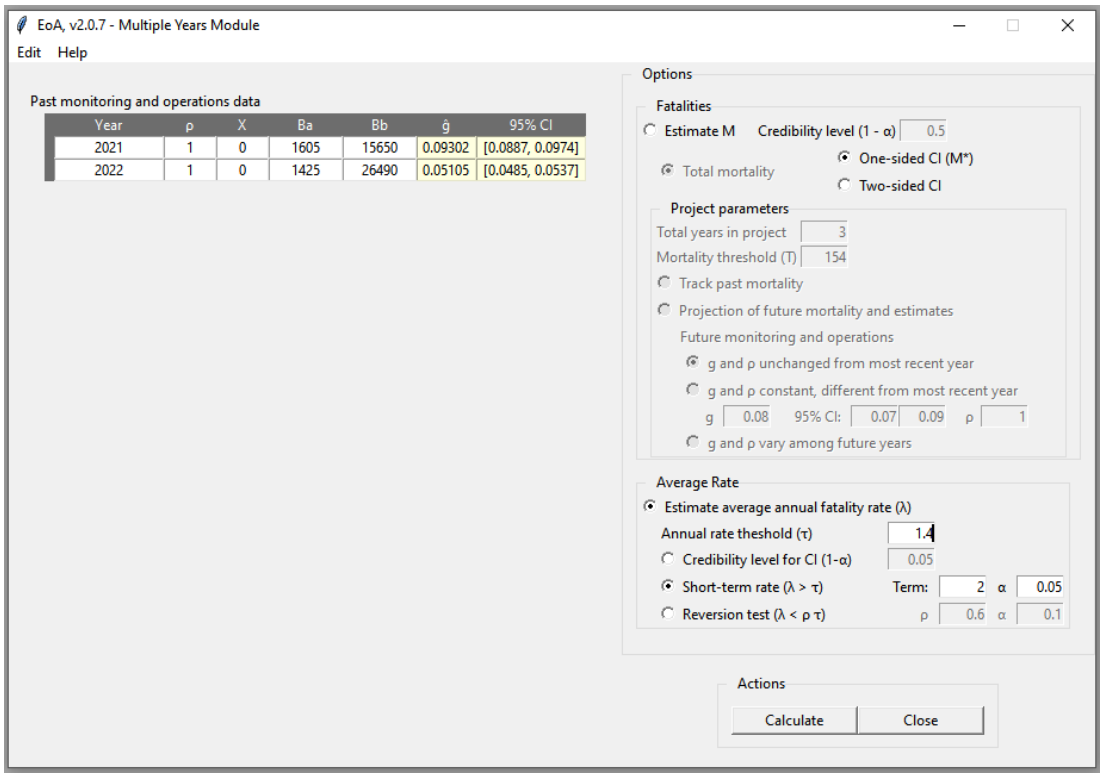


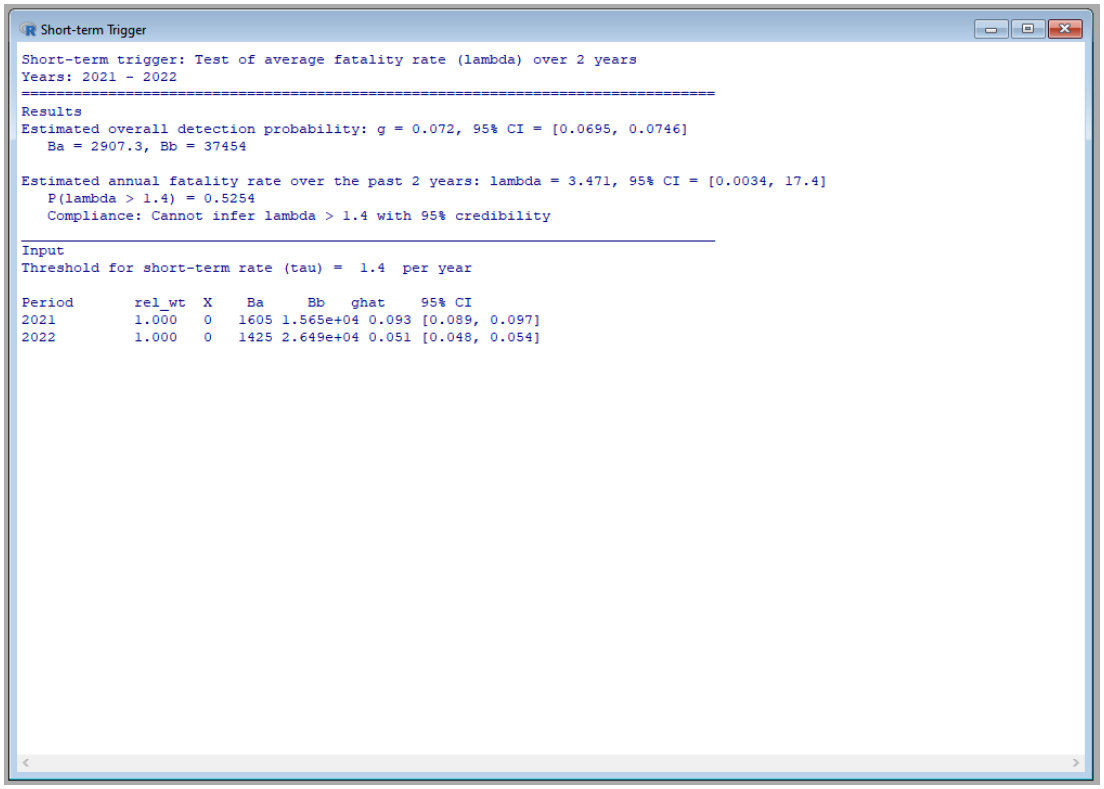


Appendix D40. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs and output for Searched and unsearched turbines 2022, searches at 111 of 414 turbines, searched at a 14-day interval in the spring and a 7-day interval in the fall.

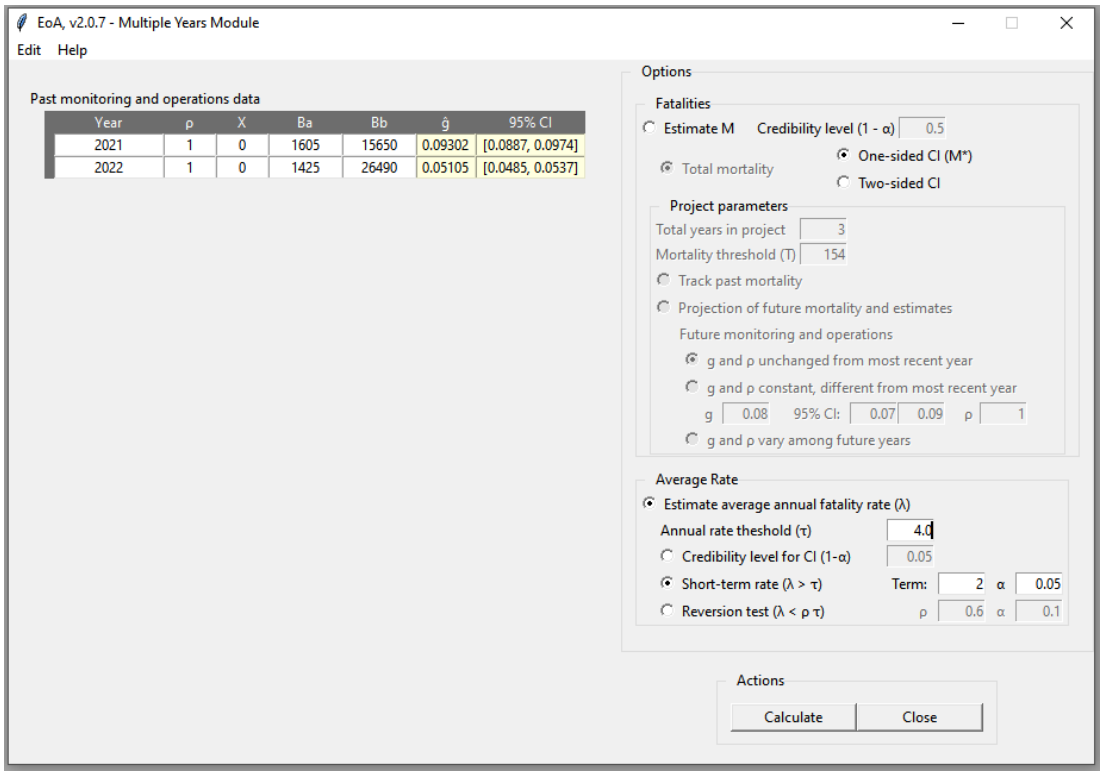


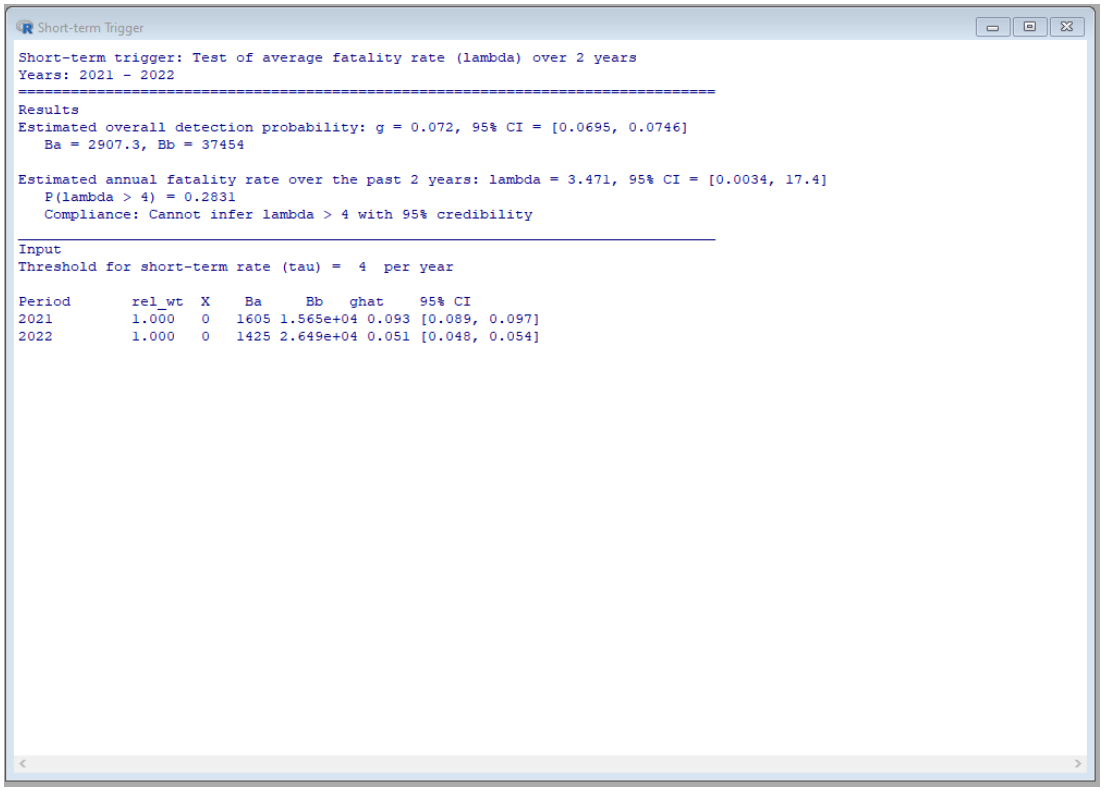
Appendix D41. Inputs and outputs from the Evidence of Absence (v2.0.7) graphical user interface Multiple Year Module for northern long-eared bat and Indiana bat Incidental Take Permit term-to-date detection probability and cumulative take estimate (*M). Inputs are based on values reported in the main text.**





Appendix D42. Inputs and outputs from the Evidence of Absence (v2.0.7) graphical user interface Multiple Year Module for northern long-eared bat rolling average detection probability and short-term adaptive management trigger test. Inputs are based on values reported in the main text.





Appendix D43. Inputs and outputs from the Evidence of Absence (v2.0.7) graphical user interface Multiple Year Module for Indiana bat rolling average detection probability and short-term adaptive management trigger test. Inputs are based on values reported in the main text.